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No. 970

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ROLE OF ASSOCIATIONS IN INDUSTRY DISCUSSED

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 4, Apr 81 pp 59-67

/Article by B. Gubin, deputy director of the Scientific Research Institute of Planning and Norms attached to USSR Gosplan: "The Planned Development of the System of Associations in Industry"/

/Text/ The measures aimed at the improvement of the management of associations are playing a large role in the improvement of the economic mechanism. The internal structure of productive forces finds expression in the forms of production-management integration and in the creation of complexes (associations) which differ in scale, structure and type. The formation of complexes is one of the most important elements of the management of the development of production by changing the organizational forms of the production units of the national economy.

At present there are more than 3,700 production associations, about 200 scientific production associations, several hundred agro-industrial and other intersectorial associations and more than 500 all-union and republic industrial associations in the country. Territorial production complexes are being formed, the industrial centers of Moscow, Leningrad, Sverdlovsk and other cities are being developed. In practice it is a question no longer of certain types of complexes (associations) or others, but of a system of production-management complexes, within which they should interact, complementing each other and ensuring the increase of production efficiency.

The creation of a system of such complexes will make it possible to solve effectively the problems of the fundamental combination of the most important elements of production and management under the conditions of the growing influence of scientific and technical progress.

Production, scientific production and industrial associations hold a most important place in the forming system. The distinctive feature of associations as a form of the socialization of production consists in the fact that their creation presumes the simultaneous and overall increase of the level of concentration, the intensification of specialization and the improvement of the planned organization of social production. By having great production and financial means, associations implement measures on the specialization of production more extensively, solve more effectively the problems of the retooling and renovation of enterprises and utilize production capacities better. Under the conditions of associations the organization of production-management relations is facilitated, the timeliness of the deliveries of products is ensured and the conditions are created for the improvement of the system of management by means of the centralization of the most important management functions, ancillary works and services. Associations experience the influence of factors not directly dependent on their activity to a considerably smaller degree than individual enterprises.

Production associations have become the most important structural form of the primary link in the majority of sectors of industry. The proportion of the output produced by associations in the total volume of industrial output was 47.1 percent. Experience attests that at those associations where measures on the centralization of production-management functions of specialization and renovation, which became possible after the creation of the complexes, are being implemented, the indicators of the work improve significantly. Thus, at the Voronezhzernomash Production Association as a result of the implementation of these measures an economic impact was obtained due to: the reduction of the management staff--70,000 rubles, the improvement of the use of fixed capital--236,000 rubles, the improvement of the organization of ancillary works and services--27,000 rubles. The Armelektrosvet, Zaporozhtransformator, Elektroapparat (Tbilisi) and other associations of the Ministry of the Electrical Equipment Industry have achieved good results.

The task "to complete in the next 2-3 years the formation of production associations as the main cost accounting link of industry," which is specified in the decree of the CPSU Central Committee and the USSR Council of Ministers of 12 July 1979 "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality," is connected, it seems to us, with the solution of two basic problems. The first is the completion basically of the process of creating new associations with the maximum possible identification of the reserves in this area. The second and most important problem is the improvement of already existing associations in order to form on their basis unified production-management systems which are capable of realizing the advantages which are created by the merger of production units.

Practical experience shows that the organizational consolidation of production by the creation of production associations and other complexes at present is considerably ahead of the actual concentration and combination of production. The increase of production efficiency cannot be achieved with the simple joining of enterprises. The organizational merger of the latter can be regarded as a process of concentration only if measures are implemented which ensure the formation of a unified production-management complex (the specialization of production, the centralization of the most important production-management functions and others).

In 1979-1980 the process of creating production associations slowed. This is connected, first, with the fact that the reserves of the organizational consolidation of production within individual ministries, the utilization of which does not require the solution of complicated production-management problems, to a considerable extent have been exhausted. Second, ministries and departments have in practice not found ways to form intersectorial associations under the conditions of the comprehensive development of individual industrial centers and regions.

The majority of organizational measures in the area of the improvement of management, unfortunately, have a narrow sectorial orientation. This is explained, in particular, by the fact that many ministries, especially machine building ministries, which contain from 150 to 350 enterprises of different subsectors, do not have internal means for the formation of new complexes. The creation of an association often poorly realizes the potential of this organizational form. In them the work on the specialization of production units is carried out poorly, measures on the centralization of production-management functions, the retooling and renovation of works are not implemented. There are small associations. Frequently enterprises of different specializations have been included in associations. The peculiarities of the sectors, the territorial distribution of the enterprises and other factors were not always taken into account when creating production associations.

The indicated circumstances were the reason that the formation of associations did not lead to a real increase of the level of the concentration of production, which ensures a substantial improvement of the work of the main production subdivisions, and hindered the achievement of a qualitative improvement in the equipment, technology and organization of production and labor productivity. This in many ways explains the fact that as a whole the work of associations for the present leaves much to be desired. Over a number of recent years the growth rate of the gross output and labor productivity in production associations has been slightly less than for industry as a whole. However, in a number of ministries (the Ministry of the Petroleum Industry, the Ministry of the Gas Industry, the Ministry of Tractor and Agricultural Machine Building, the Ministry of the Timber, Pulp and Paper and Wood Processing Industry and others) the growth rate of production and labor productivity at production associations has been higher than the average sectorial growth rate.

In many sectors of industry along with large associations, which have considerable resources and means, there are a considerable number of production associations which consist of two or three enterprises; for example, in the system of the Ministry of the Electrical Equipment Industry about a third of the production associations include two plants each. In the Ministry of Chemical and Petroleum Machine Building 37 production associations, to which 71 enterprises belong, have been established, and only 8 associations include 3-4 enterprises each, while the remainder include 1-2 each. The establishment of such associations does not ensure the proper decrease of the number of objects of the main link.

The development of the system of production and scientific production associations for the present is to a considerable extent of a formal nature. Thus, of the 17,000 enterprises included in the system of associations about 7,500 have retained their independence. This complicates the implementation of measures on the centralization of functions and the development of internal cooperative ties. For example, at the El'fa, Elektroluch and other associations of the Ministry of the Electrical Equipment Industry the internal turnover is from 0.2 to 2.3 percent of the total production volume.

The difficulties of the organization of associations, especially in interconnection with the comprehensive development of individual regions, were clearly displayed when elaborating the draft of the general plan of the development of industry of Moscow. The imperfection of the existing relations between the development of the city as a territorial formation and the growth of the enterprises of various sectors, which are located here, and the narrow departmental approach to the solution of organizational problems are leading to disproportions and the inefficient use of the economic and social potentials of the capital.

In recent years certain organizational changes, which have been aimed at the increase of the level of the concentration of production, have been made in the majority of the sectors of industry of Moscow. In particular, 111 production and 17 scientific production associations have been created. They account for 58.7 percent of the volume of output and 55.1 percent of the workers (according to the data on 1 January 1980).

However, the possibilities of creating associations have not yet been exhausted. In the city there are 301 industrial enterprises, and 28.5 percent of them have up to 500 workers each. The organization of specialized intersectorial works for the centralized supply of their products (services) to all the enterprises of Moscow and the management of these works by the formation of special associations and enterprises are a significant reserve. In particular, this concerns repair service, the centralization of which is possible in the systems of the Ministry of the Machine Tool and Tool Building Industry, the Ministry of Construction, Road and Municipal Machine Building, the Ministry of the Electrical Equipment Industry, the Ministry of Instrument Making, Automation Equipment and Control Systems and others. For example, in the Ministry of the Electrical Equipment Industry a centralized base for the repair of electrical equipment for the enterprises of the capital can be set up owing to the increase of the production capacities of the operating Promelektroremont Enterprise from 70,000 to 400,000-450,000 units a year.

The organization of the centralized production of tools and accessories is an important problem. Tool shops exist at practically all the enterprises of Moscow. The creation in the Ministry of the Machine Tool and Tool Building Industry of a large tool association for meeting the needs of industry of the city would make it possible to obtain a significant economic impact and to free manpower and production areas. A similar solution of the problem is also possible in the output of other types of products of general machine building application (casting, forged pieces, stampings and others).

When preparing the general plan of the development of industry of Moscow it was not possible to avoid a narrow departmental approach, many enterprises are of a nonintegrated nature. And even within individual departments the development of specialization is poorly coordinated with the possibilities and prospects of organizational and structural reorganizations. The organizational changes being planned for the present are in many ways formal and are poorly oriented toward the creation on the basis of Moscow industry of a unified territorial production complex by the changeover from general-purpose, departmentally isolated, poorly specialized enterprises with a disorderly system of cooperation to associations of specialized enterprises which complement each other with allowance made for the prospects of the development of the city as a whole. Similar problems are also arising in the case of the development of Leningrad, Sverdlovsk, Khar'kov and other large industrial centers, which have significant reserves for organizational and production changes of industry on the basis of the formation of a system of associations.

The goal of the formation of production-management complexes by the combining of enterprises is the assurance of the coordination and comprehensive development of interdependent enterprises and organizations. The economic expediency of the creation of a complex is determined by how much more efficient the joint functioning of works is than their independent functioning.

At present an active search for organizational solutions, which ensure the intensification of production, the planned extension of specialization and the development of the cooperation of production, is under way in the area of the development of associations. The concentration of the available production resources for implementing the corresponding measures is possible only in conjunction with an effective investment policy. The attempts at obtaining a so-called expense-free impact, when results were expected from associations without the making of expenditures on their development, turned out, as should have been expected, to be worthless. The lack of technical and economic substantiations and plans of the development of associations and the traditional forms of the distribution of capital investments in sectors according to the principle "a little to all" are holding up the allocation of assets for the retooling and renovation of associations. In this connection the planning of the development of associations has become one of the most important problems of the day, the solution of which will make it possible to realize a unified organizational and technical concept of their development.

The planning of the development of associations should serve as the basis of the planning of their activity for the future and should ensure the fundamental coordination of measures on the improvement of the economic mechanism with the fulfillment of the national economic plan. This relationship should find reflection first of all in the planning of design operations, capital investments, contractual operations and the placement of production capacities into operation. Practical experience shows the effectiveness of the drafting of plans of the development of associations, which is clearly evident from the example of the associations of the electrical equipment, chemical, light and other sectors of industry.

The experience gained in the area of the drafting of plans of the development of new enterprises and the renovation of old ones, in the designing of automated control systems and so on is synthesized to a certain extent in the plans of associations. However, the urgent need is felt to give ministries and associations procedural assistance in the planning of the development of associations, since the Temporary Sectorwide Procedural Recommendations on the Planning of Production Associations, which are presently in effect, need substantial modification.

The planning of the creation and development of associations should ensure the systemwide solution of the problems which determine the organizational structure of the complex as a whole. Such a comprehensive plan of the association should include the most general and fundamental solutions, which govern the organization of production and management, measures on retooling, renovation and so on. Here in addition to the sections which specify the technical and economic substantiation of the organization of the production and management of the association as a whole, it is necessary in the organizational part of the plan to elaborate sections which are devoted to the organization of cost accounting and the social development of the collective. The long-range plan of the association is drafted on the basis of the plan of the development of the association.

The inadequacy of the resources being allocated for the development of the production-management complexes being created is slowing the process and decreasing its effectiveness. The weakness of the design developments on the development of complexes and the aspiration to allocate assets first of all for the construction of new enterprises are also holding up their development.

The task of expanding the operations on the retooling and renovation of production is set in the decree of the CPSU Central Committee and the USSR Council of Ministers of 12 July 1979. Such operations were also performed on a relatively small scale in the past--plans for retooling individual plants and factories were drafted. The plans of the development of associations should include these operations and should replace the plans of renovation, which were drafted earlier for individual plants and factories prior to their inclusion in associations. It is necessary for the measures on retooling and renovation, with allowance made for the prospects of the development of associations as a whole, to become the most important component of the plans of the development of associations.

Practical experience shows that the use of the existing plans of retooling and renovation for individual plants after their inclusion in an association is not always possible. The difference of the goals of these specific design developments and the tasks of the associations dictates the need for their adjustment. It seems expedient to examine the question of reconsidering the need for the implementation of individual local plans of the retooling of plants and factories in order to carry it out mainly according to the plans of the development of associations. For this there are needed: the availability of plans of development, which substantiate the overall amounts of capital investments for renovation; the determination of the possibilities of implementing the plans in the time set by the standards of construction; the inclusion in the five-year plan of the operations to be performed during the given planning period; the provision of the association with the modern equipment necessary for retooling and renovation, and others.

The optimization of the size of production associations is an important problem. The lack in the majority of sectors of formulated criteria and indicators of the optimization of the size of enterprises and associations is complicating the drafting of plans, the creation of new associations and the consolidation of operating associations and enterprises. In this connection it is necessary to step up the work on the optimization of the amounts of industrial production. Such work should have two main directions: the optimization of the size of the main link of production (enterprises and associations), which involves the improvement of the forms of the management of the economy and requires the consideration of natural and geographic conditions and the trends of the development of production during the scientific and technical revolution; the intraworks optimization of the size of the individual links of the enterprise or the production association, which depends on the level of the technology and the structure of the technological complex.

As the optimum size it is most advisable to take the size of enterprises and production associations, which is calculated on the basis of the indicators of the volume of output, the number of workers, the production capacity and others and which ensures the minimization of the public expenditures on the output of products and their delivery to the places of consumption on the scale of the sector, the combined complex of sectors, which is subject to planning, or the territorial production complex. After establishing the optimum size and production structure of the main link for the given sector there should be selected from the combines (production associations) operating within it the ones which it is possible to regard as typical ones when consolidating works and creating production associations.

The production and organizational structure of such associations should serve as the underlying basis when optimizing the composition of the main link of the sector. Here one or several types (models) of production associations can be selected for each sector. It is necessary to oblige the ministries to elaborate standards of the size of the main link (production association, enterprise) for each sector (subsector) of production with allowance made for the use of advanced equipment and technology and to approve these standards with the consent of USSR Gosplan.

The more extensive use of the standard method in the planning of associations is a necessity. The level of the scientific soundness of the measures being planned would increase significantly if there were standards: of the expenditures on the implementation of specific measures; which determine the level of the organization of production; which characterize the technical equipment of control systems and others. At present an attempt is being made by a number of scientific research organizations to prepare procedural recommendations on the development of a standard base for the planning of associations.

When planning measures provision should be made for the additional impact which can be obtained by utilizing the advantages of the association as compared with the independent development of the production subdivisions belonging to it, given the same level of necessary expenditures. For the purpose of the most accurate reflection of the real impact obtained by the association it is necessary to take into account not only the increase of the volume of output and the decrease of the production cost, but also the acceleration of the growth rate of the indicators of efficiency as compared with their increase prior to the creation of the association or the exceeding of the growth rate for the five-year plan, which was set by the plan assignments.

Practical experience indicates the effectiveness of the plans of the development (creation) of associations. Thus, the adoption of design solutions at the Sokolbumprom Association (the USSR Ministry of the Timber, Pulp and Paper and Wood Processing Industry) provided during the 10th Five-Year Plan an increase of the output of products by 4.6 million rubles and a saving from the reduction of the production cost of 1.47 million rubles. The capital outlays on the implementation of the design solutions will be recovered in 2.5 years. Plans of the development of associations are being effectively implemented in the Ministry of the Gas Industry, the Ministry of the Electrical Equipment Industry, the Ministry of Tractor and Agricultural Machine Building and a number of other ministries.

The system of measures, which is being planned, should be coordinated with the production, financial and other sections of the plan. It is important for the impact from the measures being implemented to be taken into account in the corresponding indicators of the national economy plan. The plans of capital investments and the improvement of management should be forumlated on the basis of the plans of associations. Such an approach will make it possible to substantiate more thoroughly the measures being planned and to obtain an impact from their implementation.

The formation of an efficient system of production associations requires the organization of the planned management of its development. At present the development of operating associations and the creation of new ones are completely under the jurisdiction of the individual ministries and departments. There is practically no control over this process, with the exception of the annual gathering by the USSR Central Statistical Administration of information on the number and the main production-management characteristics of the associations. The drafting of general plans of the management of the sectors of industry promoted the intensification of the organizational transformation of the main link of production, but this effect was of a one-time nature.

Associations require more and more attention. The creation on their basis of truly unified powerful production-management complexes, which are capable of solving major national economic problems, dictates the need for the strengthening of the monitoring and regulatory functions of the ministries, USSR Gosplan, the USSR State Committee for Science and Technology, the USSR Ministry of Finance and other departments in the area of the assurance of the planned development of associations and the allocation of the necessary resources. The elaboration of programs of the management of the development of existing production associations and the creation of new ones in the sectors of industry, in which the processes of the development, expansion, renovation and retooling of operating associations and the formation of new ones would be reflected, might be one of the organizational solutions of this problem. In the programs the precise dates of the implementation of the measures and the resources being allocated for this should be established and the anticipated impact should be specified. These documents should be coordinated with the plans of the improvement of the management of the sectors of industry.

It is also necessary to develop according to a plan such an important link of management as the all-union industrial associations. Their formation provided a decrease of the number of middle-level management organs among industrial ministries from 1,400 in 1977 to 500 at this time, and the size of the management staff decreased by one-half.

The analysis shows that all-union industrial associations are at the stage of formation and the search for the most efficient arrangement of their inclusion in the sectorial system of management. The main task of the further improvement of the work of industrial associations is to transform them from administrative organs into an integral component of the economic system, to ensure their economic unity with the remaining elements of the system and to make these associations unified, integral economic organizations, production-management complexes. The work experience of the Soyuzchasprom (the Ministry of Instrument Making, Automation Equipment and Control Systems), Soyuztraktorodvigatel' (the Ministry of Tractor and Agricultural Machine Building), Soyuzkriogenmash (the Ministry of Chemical and Petroleum Machine Building) and other all-union industrial associations attests to the extensive possibilities of the new form of management of a subsector and to the prospects of the development of this type of production-management complexes.

At the same time the study of the practice of the formation and the results of the activity of all-union industrial associations shown that there are a number of negative features which are responsible for the inadequate efficiency of their work. First of all it is necessary to note that when preparing the general plans of management the choice of the optimum versions of the creation of the middle level of management was not always based on the principle of the elimination of the multiple specialization of production, the concentration of all specialized enterprises, which are scattered among different ministries, and so forth. In a number of instances the ministries allowed the formal transformation of main administrations into all-union industrial associations and did not see to the timely transfer to them of the functions of the management of the activity of production associations and enterprises. In other words, the system of the organization of economic methods of management did not ensure the accomplishment in the activity of the industrial association of the goals and tasks, which are specified by the General Statute on the All-Union and the Republic Industrial Association, which was ratified by the government.

As a result of the poor organization of the implementation of the adopted decisions and statutes the rights of many all-union industrial associations and the responsibility for the state and development of production differ little from the rights and responsibility of the former main administrations. In many instances the functions are not clearly divided between the industrial associations, the ministry and the production associations, the rights and responsibility of the management staff of the all-union industrial associations are not clearly defined. The possibilities of creating centralized services and of enhancing the role of the council of directors are not being fully utilized. The commodity specialization of the production associations and enterprises, which are subordinate to the all-union industrial association, is being extended slowly. There are especially many shortcomings of this kind in the chemical, light and food industries.

In analyzing the state of affairs at industrial associations it is necessary to note that the improvement of the organizational structure of management on the middle level has a weak effect on the style and methods of the activity of ministries as a whole and on the overall results of the work of sectors. At times the managers of industrial associations try to solve a large number of comparatively minor problems, which it is advisable to place under the jurisdiction of production associations and enterprises. At the same time they are dealing slowly and not effectively enough with global problems of the study of the demand for the output of the subsector, the elaboration of comprehensive programs of the technical development of enterprises, the timely allocation of assets for materials and components, the attachment of consumers to suppliers, the development of production capacities and others.

Frequently the ministries send various instructions directly to the enterprises or the production associations, bypassing the all-union industrial associations. This in practice violates the rights of the industrial associations, since all the other links and subdivisions of sectorial management are subordinate to them. Industrial associations should perform their functions on the basis of their own resources, being entirely responsible for the end results of their utilization.

The plans of the industrial association should be drafted with allowance made for the assignments and standards of the five-year plan of all-union industrial associations on the basis of the plans of production associations, scientific production associations and enterprises. This is especially important in connection with the occurring practice of forumlating the plan of the industrial association as a simple sum of the plans of the units belonging to it. The plan obtained in this way can hardly serve as an effective tool and a basis of the work of the industrial association. With such a compilation of the plan of the association it is practically impossible to take into account the set of measures which are aimed at the development of the all-union industrial association as a unified production-management complex. The formed situation in many ways is a consequence of the fact that the approval of procedural recommendations on the drafting of the plans of industrial associations is being held up.

In connection with the inclusion of the industrial association in the sphere of reproduction not only as a guiding element, but also as a system which has specific production-management functions (in particular, in connection with the centralization of some of them within the all-union industrial association), the nature of the relative economic isolation of the units and, consequently, the nature of the methods of the economic and organizational regulation of their activity are changing.

The industrial association is not the arithmetic sum of the enterprises and production associations which make it up, but a unified production-management complex. The organizational, technical and economic unity of the industrial association is the basis of its integrity as a complex. The efficiency of the all-union industrial association can be increased if a comprehensive system of the planning, stimulation and organization of management, which conforms to the specific nature and peculiarities of the position of the industrial association in the overall system of sectorial management, is elaborated and used.

Being an important element of the sectorial system of management, all-union industrial associations have a substantial influence on its development. The formation of industrial associations and the actual, and not formal, distinction of the middle level from the staff of the ministries will make it possible to solve more flexibly the questions of the development of sectors, which are connected with intersectorial problems and with the assurance of close ties of the works which make a specific final product. The existence in the system of a ministry (it is a question first of all of all-union industrial ministries) of 10-15 large production-management complexes makes it possible if necessary to raise the question of changing the structure of the operating sectors: the regrouping of the all-union industrial associations within the functioning ministries, the consolidation or subdivision of sectors.

In order to prepare the necessary base for the solution of these questions, in the sectorial ministries it is necessary to make a thorough, comprehensive analysis and calculations for the making of the best decisions with respect to the composition, structure and technological relations of production and scientific production associations, their retooling and renovation, as well as to specify the composition and structure of the middle levels of management with allowance made for the increase of their role in the development of the sectorial system of management in the immediate future. This work should be performed when elaborating the general plans of the management of the sectors of industry.

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INVESTMENT, BUDGET, PRICES AND FINANCE

RELATIVE STABILITY OF SOCIALIST PRICES POINTED OUT

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 4, Apr 81 pp 38-45

/Article by Candidate of Economic Sciences Docent A. Savchenko: "The Relative Stability of Socialist Prices"/

/Text/ In the Main Directions of USSR Economic and Social Development for 1981-1985 and the Period to 1990 the task is set "to improve pricing in the sectors of the national economy as an important tool of planned management." The increase of the effectiveness of relative stable prices as a tool of planned management is one of the significant directions in its solution. The main demand which is being made on relatively stable prices at the present stage of the development of the socialist economy is "to maintain during the five-year plan stable wholesale prices in industry, estimate prices in capital construction and rates for freight transportation,"[1] and also, as is noted in the Main Directions, "to consistently pursue a policy of ensuring /the stability of state retail prices/ /in boldface/ for basic foodstuffs and nonfood consumer items."

Relative stability is an important advantage of socialist prices. However, in order for relatively stable prices to be an effective tool of planned management, the latter should be based on a conscious scientific understanding of the mechanism of their functioning. Meanwhile this mechanism has still not received thorough coverage in our literature. Only a few scientists are directing attention to the relative stability of socialist prices. Their opinion on relatively stable prices reduces primarily to the assertion that owing to their stability they deviate from the value.[2] The indicated deviation is explained by the fact that in the case of a constant price the value of a commodity changes. Hence the conclusion is drawn that the nature of the deviation of the relatively stable prices from the value also depends on the direction of the change of the value. But the conclusions of this type are primarily of a hypothetical nature. In our opinion, such an interpretation of relatively stable prices incorrectly reflects reality.

Let us first formulate three circumstances on which we will base ourselves in the process of studying the raised question. First, those prices, which remain constant for a specific time, regardless of the change of the value of a commodity, are understood as relatively stable prices. The production cost of some year, which becomes the base year, is taken as their underlying base. Either the first year of validity of the prices, the year preceding the placement of the prices into effect, or an even more remote year is taken as the base year. Thus, when determining the wholesale prices to be put into effect on 1 January 1982 the production cost according to the plan for 1981 was basically taken as the underlying base. Second, the price of a single commodity should be understood as the relatively stable prices. For in practice prices are set not for an entire group of a commodity of an entire sector, but for the corresponding unit of its measurement. As for the price of the aggregate commodity of a sector, its level is formed as the product of the price of a single commodity times its total amount. Third, here it is appropriate to recall that the value of a single commodity changes at the same time as the change of labor productivity. And, on the contrary, the value of the aggregate commodity of a sector does not undergo change with a change of the labor productivity. Here we understand by the latter the productivity of the aggregate labor, which is proportionate to the value of the commodity.

What happens if the price of a single commodity remains constant, while its value decreases? The productivity of the labor expended in the sector increases. The latter finds expression in the increase of the aggregate commodity of the sector. But since the relatively stable prices of the single commodities remain constant, the price of the aggregate commodity of the sector increases. Moreover, this occurs not in connection with an increase of its value, but owing to the increase of the amount of the commodity with constant prices for a unit of it. Under these conditions the price of the aggregate commodity of the sector increases more rapidly than its value. Since relatively stable prices are used in all sectors, the indicated process also occurs in social production as a whole. The increase of the productivity of the labor expended in social production under the conditions of relatively stable prices has the result that the price of the aggregate social commodity increases more rapidly than its value. Attention is not being directed to the latter circumstance. Meanwhile, it introduces a fundamentally new thing in the analysis of relatively stable prices, since it is equivalent to a decrease of the monetary scale, that is, to a decrease of the amount of value, which is represented in the monetary unit. According to our estimates, during 1960-1979 the price of the aggregate social commodity in the USSR increased 3.27-fold, while its value increased only 1.72-fold. Such a leading growth of the price of the aggregate social commodity with respect to its value reflects a decrease of the monetary scale to ten-nineteenths.[3]

The coefficient of the decrease of the monetary scale depends on the coefficient of the lead of the price of the aggregate social commodity over its value. Let, for example, during the base year the price of the aggregate social commodity be equal to $Ц^{б}$ and the value be equal to $T^{б}$. This means that during the base year the monetary scale ($M^{б}$), that is, the amount of labor, which expresses 1 rubles during the given year, can be determined according to the formula:

$$M^{б} = \frac{T^{б}}{Ц^{б}} . \tag{1}$$

Now let us assume that during the year being analyzed the price of the aggregate social commodity ($Ц^{а}$) increased by X times ($Ц^{а} = XЦ^{б}$), while its value increased by Y times ($T^{а} = YT^{б}$). Hence follows the magnitude of the monetary scale during the year being analyzed:

$$M^{а} = \frac{YT^{б}}{XЦ^{б}} . \tag{2}$$

Since the price of the aggregate social commodity is increasing more rapidly than its value, $X > Y$. Under the indicated conditions the coefficient of the lead of the growth rate of the price of the aggregate social commodity over its value will be:

$$\frac{XЦ^{б}}{Ц^{б}} : \frac{YТ^{б}}{Т^{б}}, \text{ that is, } \frac{X}{Y}.$$

But the monetary scale decreases in the same proportion:

$$\frac{Т^{б}}{Ц^{б}} : \frac{YТ^{б}}{XЦ^{б}}.$$

This means that an inversely proportionate relationship exists between the above-named coefficient and the coefficient of the change of the monetary scale.

If the prices are stable, there is not need to specially demonstrate that the increase of the price of the aggregate social commodity reflects the increase of its physical volume and, upon further examination, the increase of its use value. Consequently, in this case the use value of the aggregate social commodity increases more rapidly than its value. But this is only one expression of the increase of the productivity of the aggregate national labor. Therefore we can assert that within the relative stability of prices the coefficient of the lead of the growth rate of the price of the aggregate social commodity over the growth rate of its value reflects the growth rate of the productivity of the aggregate national labor.

And, indeed, $Ц^{б}$ and $XЦ^{б}$ do characterize in our country the value of the aggregate social commodity in constant prices respectively in the base year and the year being analyzed, while $Т^{б}$ and $YТ^{б}$ characterize the amount of aggregate labor which is expended on their production during the corresponding years. Therefore, basing ourselves on the method used in our practice, let us define the productivity of the aggregate national labor:

$$q^{б} = \frac{Ц^{б}}{Т^{б}}, \tag{3}$$

$$q^{а} = \frac{XЦ^{б}}{YТ^{б}}, \tag{4}$$

where $q^{б}$ and $q^{а}$ are the productivity of the aggregate national labor respectively during the base year and the years being analyzed.

Hence the growth rate of the productivity of the aggregate social labor ($q^{а}/q^{б}$) will be $(XЦ^{б}/YТ^{б}) : (Ц^{б}/Т^{б})$, that is, X/Y. As was shown above, the coefficient of the lead of the growth rate of the price of the aggregate social commodity over the growth rate of its value also has the same value. This additional confirms the conclusion, in conformity with which this coefficient characterizes the growth rate of the productivity of the aggregate national labor. But if this is so, the inversely proportionate relationship between this coefficient and the coefficient of the change of the monetary scale is transformed into the inversely proportionate relationship between the rates of change of the productivity of the aggregate national labor and the monetary scale:

$$\frac{q^{а}}{q^{б}} = \frac{M^{б}}{M^{а}}. \tag{5}$$

The decrease of the monetary scale is not a formal circumstance for socialist prices. Since the price is an expression of the value of a commodity by means of money, the decrease of the value which is represented in a monetary unit reflects a specific change which is taking place in prices. The question arises, what change occurs with the relatively stable prices in connection with the decrease of the monetary scale? The answer to it is connected with the need to distinguish two forms of the change of prices--the nominal and the real forms.

By a nominal change we understand that change of the price, in case of which it continues to reflect the previous amount of labor. It reflects only the change of the amount of the money name and does not at all characterize the change of the amount of the value of a commodity or the deviation of the price from the value. Therefore when we say that socialist prices are relatively stable, it is a matter only of their nominal stability, of their invariability as a money name of the labor embodied in the commodity.

A real change of the price occurs when the amount of labor, which the price expresses, changes. Depending on whether or not it coincides with the change of the value of the commodity, this concept reflects different processes. If as a result of a change of the price the amount of labor represented in it changes by the same proportion as the amount of labor embodied in the commodity changes, such a real change of the price is equivalent to the change of the value of the commodity. In this case the change of the price is only a different expression of the change of the value of the commodity. If in this process the proportionality is disturbed, either a deviation of the price from the value or its approximation of it occurs.

The price can change really at the same time as its nominal change. This occurs when the money name of the value changes not by the same proportion as the monetary scale changes. But the price can also change really in the case of the invariability of the money name of the value. The ability for such a change is also characteristic of relatively stable prices. Since the functioning of relatively stable prices is accompanied by a decrease of the monetary scale, then, without changing as the money name of the value of a commodity, they acquire the ability to express a smaller amount of labor, that is, are subject to a real decrease. If during the base year the amount of labor, which is represented in the relatively stable prices, is $Ц^{о.с.} \cdot М^{б}$, while during the year being analyzed it is $Ц^{о.с.} \cdot М^{а}$, the coefficient of its real decrease can be defined in the following manner:

$$K = \frac{Ц^{о.с.} \cdot М^{б}}{Ц^{о.с.} \cdot М^{а}} , \qquad (6)$$

amount of labor, which is represented in the relatively stable prices, is $Ц^{о.с.} \cdot М$, while during the year being analyzed it is the price /as published/.

Since the relatively stable prices during the base year and the year being analyzed are nominally identical, the coefficient of their real decrease is equal to the coefficient of the decrease of the monetary scale ($М^{б}/М^{а}$).

Thus, under the conditions of a decreasing monetary scale the relatively stable prices are not constant, but are subject to a real decrease. Hence, it is necessary to examine the question of the correlation between the relatively stable prices and the value of a commodity with allowance made for their real decrease.

Let us turn to the analysis of the indicated correlation. As was shown above, the real decrease of the relatively stable prices occurs in the same proportion as the monetary scale decreases. But the latter changes in inverse proportion to the change of the productivity of the aggregate national labor. Consequently, the real change of the relatively stable prices also occurs in each sector in inverse proportion to the change of the productivity of the aggregate national labor. Indeed, if $(М^{\text{б}}/М^{\text{а}}) = (q^{\text{а}}/q^{\text{б}})$, while $(М^{\text{б}}/М^{\text{а}}) = (Ц^{\text{о.с.}} \cdot М^{\text{б}}/Ц^{\text{о.с.}} \cdot М^{\text{а}})$, then it is inevitable that $(Ц^{\text{о.с.}} \cdot М^{\text{б}}/Ц^{\text{о.с.}} \cdot М^{\text{а}}) = (q^{\text{а}}/q^{\text{б}})$. As to the value of the commodity, it, as is known, changes in conformity with a different law--in inverse proportion to the productivity of the labor which was expended in the sector:

$$\frac{t^{\text{б}}}{t^{\text{а}}} = \frac{q_{\text{о}}^{\text{а}}}{q_{\text{о}}^{\text{б}}} , \tag{7}$$

where $t^{\text{б}}$ and $t^{\text{а}}$ are the value of a single commodity respectively during the base year and the year being analyzed; $q_{\text{о}}^{\text{б}}$ and $q_{\text{о}}^{\text{а}}$ are the productivity of the sectorial labor during the base year and the year being analyzed.

What has been said above makes it possible to assert that the correlation between the relatively stable prices and the value of a commodity changes subject to the correlation between the growth rates of the productivity of the aggregate national labor and the productivity of the sectorial labor. The latter correlation can have three versions. Let us dwell on each version separately. At the same time let us agree that during the base year the relatively stable prices are set at the level of the value of the commodity.

First version. The productivity of the aggregate national labor increases by the same proportion as the productivity of the sectorial labor $(q^{\text{а}}/q^{\text{б}} = q_{\text{о}}^{\text{а}}/q_{\text{о}}^{\text{б}})$. In this case the relatively stable prices and the value of the commodity decrease (the former really) by an equal proportion. Since during the base year the relatively stable prices were equal to the value, this equality will also not be disturbed during the year being analyzed. In a comparable form the equality between the relatively stable prices and the value of the commodity appears as an equality between the relatively stable prices and the price which is equal to the value. The level of the latter during the year being analyzed is determined according to the following equation:

$$Ц^{\text{а}}_{(=t)} = \frac{t^{\text{а}}}{М^{\text{а}}} . \tag{8}$$

Hence the equality between the relatively stable prices and the value of the commodity during the year being analyzed can be expressed in the following manner:

$$Ц^{\text{о.с.}} = \frac{t^{\text{а}}}{М^{\text{а}}} . \tag{9}$$

The existence of an equality in equation (9) can be proven on the basis of the method substitutions. For this purpose let us replace $Ц^{\text{о.с.}}$ by $t^{\text{б}}/М^{\text{б}}$ (since the relatively stable prices are defined in our country at the level of the value of the commodity during the base year). In place of the value of the commodity during the year being analyzed $(t^{\text{а}})$ let us substitute its value, which was calculated according to equation (7) $(t^{\text{б}} \cdot (q_{\text{о}}^{\text{б}}/q_{\text{о}}^{\text{а}}))$, and in place of the monetary scale during the year being analyzed ($M^{а}$) let us take its value, which was calculated according to equation (5) ($M^{б}\cdot(q^{б}/q^{а})$). As a result of these substitutions and transformations we obtain the following equation:

$$\frac{t^{а}}{M^{а}}=\frac{t^{б}}{M^{б}}\cdot\frac{\frac{q_{o}^{б}}{q_{o}^{а}}}{\frac{q^{б}}{q^{а}}}. \qquad (10)$$

Since the growth rate of the productivity of the sectorial labor in this case is equal to the growth rate of the aggregate national labor ($q_{o}^{а}/q_{o}^{б}) = (q^{а}/q^{б}$), equation (10) can express only an equality. Hence, the relatively stable prices are equal to the value.

Second version. The productivity of the aggregate national labor increases by a greater proportion than the productivity of the sectorial labor ($q^{а}/q^{б} > q_{o}^{а}/q_{o}^{б}$). In this case the relatively stable prices really decrease by a greater proportion than the value of the commodity decreases ($Ц^{о.с.}\cdot M^{б}/Ц^{о.с.}\cdot M^{а} > t^{б}/t^{а}$). Owing to this the relatively stable prices deviate downward from the value ($Ц^{о.с.} < t^{а}/M^{а}$).

Since the relatively stable prices decrease in inverse proportion to the growth rate of the productivity of the aggregate national labor, while the value of the commodity decreases in inverse proportion to the growth rate of the productivity of the sectorial labor, the relatively stable prices will inevitably deviate from the value in direct proportion to the deviation of the inverse of the growth rate of the productivity of the aggregate national labor from the inverse of the growth rate of the productivity of the sectorial labor:

$$\Delta Ц_{(=с)}^{о.с.}=\frac{\frac{q^{б}}{q^{а}}-\frac{q_{o}^{б}}{q_{o}^{а}}}{\frac{q_{o}^{б}}{q_{o}^{а}}}. \qquad (11)$$

where $\Delta Ц_{(=с)}^{о.с.}$ is the coefficient of the deviation of the relatively stable prices from the value.

The conclusion drawn by us is also demonstrated mathematically. For this purpose let us represent the equation for determining the coefficient of the deviation of the relatively stable prices from the value in a most general form:

$$\Delta Ц_{(=с)}^{о.с.}=\frac{Ц^{о.с.}-\frac{t^{а}}{M^{а}}}{\frac{t^{а}}{M^{а}}}. \qquad (12)$$

Now in equation (12) let us make the same substitutions as in equation (9):

$$\Delta Ц^{o.c.}_{(-t)} = \frac{\frac{t^a}{M^a} - \left(t^б \times \frac{q_0^б}{q_0^a} M^б \times \frac{q^a}{q^б}\right)}{t^б \times \frac{q_0^б}{q_0^a} M^б \times \frac{q^a}{q^б}}.$$

After the appropriate transformations and reductions, equation (12) assumes the same form as equation (11):

$$Ц^{o.c.}_{(-t)} = \frac{\frac{q^a}{q^б} - \frac{q_0^a}{q_0^б}}{\frac{q_0^a}{q_0^б}}.$$

Since $(q^a/q^б) > (q_0^a/q_0^б)$, $\Delta Ц^{o.c.}_{(-t)}$ will have a minus sign, which attests to the deviation of the relatively stable prices downward from the value.

Third version. The productivity of the aggregate national labor increases by a smaller proportion than the productivity of the sectorial labor ($q^a/q^б < q_0^a/q_0^б$). In this case the relatively stable prices really decrease to a smaller extent than the value of the commodity decreases ($Ц^{o.c.} \cdot M^б / Ц^{o.c.} \cdot M^a < t^б/t^a$) and as a result deviate upward from the value ($Ц^{o.c.} > t^a/M^a$). The coefficient of this deviation is determined according to equation (11), which was also used in the second version. But since here $(q^a/q^б) < (q_0^a/q_0^б)$, $\Delta Ц^{o.c.}_{(-t)}$ will have a plus sign.

Summarizing the preliminary results, we should note the following. First, the assertion existing in the literature that the nature of the deviation of the relatively stable prices from the value depends on the direction of the value of the commodity is illegitimate. As we have shown above, in all three versions the direction of the change of the value is the same--it decreases. However, the correlation between the relatively stable prices and the value in each of the three versions is of a different nature. In the first it does not change, in the second the relatively stable prices deviate downward from the value, while in the third they deviate upward from it.

The incorrect interpretation of the mechanism of the functioning of the relatively stable prices, which exists in the literature, is explained by the fact that when studying it no distinction is made between the nominal and real forms of the change of prices. Therefore the nominal invariability of the relatively stable prices is understood as their invariability in general. In reality, without changing nominally, the relatively stable prices, in connection with the decrease of the monetary scale, are subject to a real decrease. Consequently, they deviate from the value not because they are invariable with a change of the value, but because the real change of the relatively stable prices does not correspond to the change of the value of the commodity.

Second, the relatively stable prices deviate from the value not arbitrarily, but according to the corresponding law: in direct proportion to the deviation of the inverse of the growth rate of the productivity of the aggregate national labor from the inverse of the growth rate of the productivity of the sectorial labor.

But this is not all. Up to now we have proceeded on the assumption that socialist prices are set at the level of the value. The indicated assumption is also the basis for the notions about the relatively stable prices, which occur in our literature. Meanwhile in real life socialist prices under the influence of various factors are set, as a rule, at a level which is not equal to the value. Consequently, in this case not the value, but the price which is not equal to the value is the basis for the relatively stable prices. In the base year the price, which is not equal to the value, is determined according to the following equation:

$$\text{Ц}^{\text{б}}_{(\neq t)} = \frac{Qt^{\text{б}}}{\text{М}^{\text{б}}} , \tag{13}$$

where Q is a coefficient which reflects the degree of deviation of the price from the value; if it is greater than 1, the price is greater than the value, if it is less than 1, it is less than the value.

Since the relatively stable prices are set at the level of the price which is not equal to the value during the base year, their level can be determined in the following manner:

$$\text{Ц}^{\text{о.с.}} = \frac{Qt^{\text{б}}}{\text{М}^{\text{б}}} . \tag{14}$$

Now let us determine the coefficient of the deviation of the relatively stable prices from the price which is not equal to the value during the year being analyzed. The latter is formed on the basis of the value and the monetary scale of the year being analyzed and with allowance made for the coefficient of the deviation from the value, which was used when planning it:

$$\text{Ц}^{\text{б}}_{(\neq t)} = \frac{Q^{\text{а}}}{\text{М}^{\text{а}}} . \tag{15}$$

Hence follows the equation, by means of which it is possible to determine the coefficient of the deviation of the relatively stable prices from the price which is not equal to the value:

$$\Delta\text{Ц}^{\text{о.с.}}_{(\neq t)} = \frac{\text{Ц}^{\text{о.с.}} - \frac{Qt^{\text{а}}}{\text{М}^{\text{а}}}}{\frac{Qt^{\text{а}}}{\text{М}^{\text{а}}}} . \tag{16}$$

Based on the method of substitutions, let us replace $\text{Ц}^{\text{о.с.}}$ by $(Qt^{\text{б}}/\text{М}^{\text{б}})$, $Qt^{\text{а}}$ by $Qt^{\text{б}} \cdot (q_{\text{п}}^{\text{б}}/q_{\text{п}}^{\text{а}})$ and $\text{М}^{\text{а}}$ by $\text{М}^{\text{б}} \cdot (q^{\text{б}}/q^{\text{а}})$. After making the appropriate transformations and reductions, equation (16) assumes the same form as equation (11):

$$\Delta\Pi^{n,\phi}_{(\tau i)} = \frac{\frac{q^{t}}{q^{o}} - \frac{q^{0}_{n}}{q^{t}_{n}}}{\frac{q^{0}_{n}}{q^{t}_{n}}}.$$

The obtained equation makes it possible to assert that the relatively stable prices deviate from the price which is not equal to the value in direct proportion to the deviation of the inverse of the growth rate of the productivity of the aggregate national labor from the inverse of the growth rate of the productivity of the sectorial labor. Consequently, the fact that during the base year the relatively stable prices are set at a level which is not equal to the value does not at all violate the law which we derived with allowance made for the fact that the value is the basis for them. The difference is merely that in this case this law determines the degree of deviation of the relatively stable prices from the price which is not equal to the value, since the latter occupies here the place in which the value formerly was. In this end this gives us the right to assert that the relatively stable prices deviate from the price which is being put into effect, regardless of whether or not it is equal to the value.

The level of the price being put into effect is determined by the planning method, on the basis of the value of the commodity and the factors which deviate the price from the value. We call the price, which is set by the planning method, the price of the planned level. It should be understood not as the nominal level, but as the real level of the price which was determined by the planning method; not as the amount of the money name of the value, but the degree of the reflection by the price of the value of the commodity. Thus, if the price set by the planning method was set at the level of the value of the commodity, the value of the year being analyzed, hence, is the basis for the relatively stable prices. If the price set by the planning method was set at a level which deviates from the value by a known proportion, the price which deviates from the value of the year being analyzed by the same proportion is the basis for the relatively stable prices.

The circumstance, in conformity with which the relatively stable prices deviate from the price of the planned level, attests that the formation of the level of socialist prices does not end with the process of their planning. The level of socialist prices is also subject to real change during the process of their relatively stable functioning. The deviation of the relatively stable prices from the price of the planned level is an objective phenomenon. It occurs regardless of whether or not we have perceived it. In other words, the indicated deviation occurs automatically. Therefore, the problem of using the relatively stable prices in practice reduces to the determination not of the level of these prices, but only of the degree of their deviation from the price of the planned level.

FOOTNOTES

1. "'Ob uluchshenii planirovaniya i usilenii vozdeystviya khozyaystvennogo mekhanizma na povysheniye effektivnosti proizvodstva i kachestva raboty'. Postanovleniye TsK KPSS i Soveta Ministrov SSSR ot 12 iyulya 1979 goda" /"On Improving

Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality." Decree of the CPSU Central Committee and the USSR Council of Ministers of 12 July 1979], Kiev, Politizdat Ukrainy, 1979, p 11.

2. See V. M. Batyrev, "Tovarno-denezhnyye otnosheniya, finansy i kredit" [Commodity-Money Relations, Finances and Credit], Moscow, "Finansy", 1970, p 93; I. I. Lukinov, "Vosproizvodstvo i tseny" [Reproduction and Prices], Moscow, "Ekonomika", 1977, p 320; P. S. Mstislavskiy, "Lenin's Ideas Are the Theoretical Basis of Planned Pricing," "V. I. Lenin i problemy planovogo tsenoobrazovaniya" [V. I. Lenin and the Problems of Planned Pricing], Moscow, Preyskurantizdat, 1970, pp 50-51.

3. The monetary scale is calculated as the quotient from the division of the number of average annual workers of physical production by the monetary expression of the national income in current prices respectively in 1960 and 1979. Hence the value of the aggregate social commodity is the product of its price times the monetary scale. The indicated calculations were made on the basis of the data of the statistical yearbooks: "Narodnoye khozyaystvo SSSR v 1970 g." [The USSR National Economy in 1970], Moscow, 'Statistika", 1971, pp 60, 508, 510, 533; "Narodnoye khozyaystvo SSSR v 1979 g." [The USSR National Economy in 1979], Moscow, "Statistika", 1980, pp 54, 386, 397, 405.

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INVESTMENT, PRICES, BUDGET AND FINANCE

KONDRASHOV DISCUSSES WHOLESALE PRICES, PRODUCTION

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 4, Apr 81 pp 67-71

/Article by Candidate of Economic Sciences G. Kondrashov: "Strengthening the Influence of Wholesale Prices on the Increase of Production Efficiency"/

/Text/ In conformity with the decree of the CPSU Central Committee and the USSR Council of Ministers of 12 July 1979, "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality," in industry much attention is being devoted to the comprehensive approach to the planning of the technical and economic indicators of the development of the sector with allowance made for the effect of such economic categories as the price, the production cost, the profit (profitability), labor productivity, wages, bonuses, credit and cost accounting.

The successful comprehensive planning of production presumes the sound coordination of prices with the production volume, labor productivity and other plan indicators. The proper calculation of all other value indicators depends on how economically sound the elements are of which the price consists. The coordination of the physical resources of the plan is ensured by means of prices.

At present an important role in the planning of production is assigned to the indicator of the standard net output, which characterizes most completely the contribution of the enterprise to the development of production--the production volume of the gross (commodity) output, labor productivity, the output-capital ratio, the yield of output per square meter of production space, sales, the production cost, the profit (profitability). However, the system of the indicated indicators will provide a correct idea of the work of associations and enterprises only when it is based on economically sound wholesale prices, which reflect more completely the expenditures of socially necessary labor.

At present for some goods the wholesale prices do not express the socially necessary labor expenditures, dipping considerably below the cost, while for others an unjustifiably high profitability of production has formed. As a result of the fact that wholesale prices often establish mechanically the level of expenditures on the production of the output, as a whole they are tending to increase, while the prices should actively influence the reduction of the production cost and the increase of the productivity of national labor.

For precisely this reason the main direction of the further improvement of wholesale prices is their reduction by means of the decrease of the material and labor expenditures on production and the lowering of the price of other elements of the production cost. It is possible to accomplish this first of all by the strict adherence in production to advanced rates and standards of the consumption of raw materials, materials, wages, fuel, electric power, spare parts, components and other elements of the production cost. It is also necessary to organize the analysis and monitoring of the application of rates of consumption of resources in production by comparing the actual expenditures with the standard expenditures by elements of the production cost. This will also mean the strengthening of the production cost as the base of pricing and as the most important indicator of the work of enterprises and the increase of the level of the planning of production.

The decrease of the production cost is directly connected with the problem of the profitability. It is impossible to agree with the position of some economists, who believe that the stimulation of rapid rates of the development of individual sectors should be accomplished by means of a higher standard of profitability.[1] In our opinion, the standard of the profitability, which is calculated with respect to the average annual value of the productive capital, in principle should be uniform for all sectors, since each sector has the right to obtain the same profit per 1,000 rubles of productive capital. At the same time the standard will be different with respect to the production cost of the sector, since the turnover of capital by sectors is different. It depends on the specific nature of the work of the sector, and first of all on the ratio of fixed and working capital. The suggestion to establish a higher standard of profitability for the output of one sector or another is unacceptable because in this case it would be necessary to increase substantially the budget capital investments in the sectors which are the consumers of this output.

The work experience of machine building enterprises on the production of nonstandard equipment attests that at present its prices and production cost are tending to increase. This has been caused by the unfounded overstatement in the plan of the indicators of the profit, the production volume and the labor productivity.

Thus, the wholesale prices for some products are set on the basis of the highest planned expenditures of the first year of their assimilation, while the statutes in force in the sector provide for the establishment of wholesale prices for new technology in the second, and in some instances the third, year. Here the prices of similar equipment are not taken into account. The existing procedure of forming the prices for products which are manufactured at temporary prices, as well as according to one-time orders, is being violated. As a result a high above-standard profitability is formed from the production of nonstandard equipment.

The overstating of wholesale prices was the result of the setting for enterprises for the 10th Five-Year Plan of excessively high assignments on the increase of the profit and the decrease of the expenditures on the output of products. The enterprises are not able to fulfill the plan assignment only by means of organizational and technical measures. Hence arises the aspiration to overstate the wholesale prices and the profitability of products. Such a practice merely aggravates the imbalance of the value and physical indicators of the national economic plan, since overstated prices impede the introduction of technical progress and complicate the supply of the necessary technology for consumers and for the entire national economy.

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[1] See Sh. V. Ruseishvili, "The Role of Prices in the Stimulation of Scientific and Technical Progress," SREDSTVA SVYAZI, No 4, 1978, p 15.

For the purposes of reducing the level of wholesale prices and increasing their influence on the decrease of the cost of the technology being produced, the wholesale prices being put into effect on 1 January 1982 take into account the prospects of the development of the technical base of production and labor productivity by means of all factors, including the decrease of the cost of components. Moreover, the principle according to which a higher profitability, which can be achieved by reducing the prices for items assimilated long ago, is stipulated for new products, was taken into account in order to solve the main question of technical progress--the problem of stimulating the production of fundamentally new technology.

The practice of the current reduction of prices must be critically examined and means of regulating it must be outlined. A shortcoming of this practice was the fact that the decrease of the prices for assimilated technology in the financial plans of enterprises is not taken into account in good time, although there is a procedure, in conformity with which the work on reducing prices should be completed by the beginning of the second quarter of the current year. In connection with the fact that the profitability of the output of assimilated products is considerably higher than that of new products, manufacturing enterprises are not interested in reducing the prices for them.

Now a new procedure has been established, which regulates the level of the reduction of prices. In conformity with it the prices for highly profitable types of products will be reduced for producers with the maintenance of the old level of prices for the consumers of the products. The difference between the prices should be contributed by the suppliers to the revenue of the state budget.

As a stimulus of the production of new technology some economists propose to use the credit for offsetting the additional expenditures connected with its assimilation, since there are not enough assets of the assimilation fund. But the credit needs to be repaid from the additional profit of the measure for which the credit was extended after the period of assimilation, which requires the stepping up of bank monitoring of the use of loans. Moreover, this will not help to solve the main problem of changing the ratio of the prices for new and assimilated technology in favor of the former and, consequently, as in the past the producers will not be interested in increasing its production. Therefore, the current regulation of wholesale prices by means of the mechanism of two prices for assimilated products (the old and new prices), in our opinion, is more advisable.

The principle, according to which the wholesale prices for the products of industry should be revised at the same time as the compilation of the national economic five-year plan, has now been advanced. This means that the prices should be revised no more often than once in a 5-year period. Here the problem of the current regulation of wholesale prices also remains urgent. In our opinion, with reference to the group of such sectors as the electrical equipment industry, the electronics industry, the radio industry and the communications equipment industry, in which from year to year the production cost has been decreasing rapidly and the profitability of the output of products has been increasing (especially in the case of the assimilation of series production), the current regulation of wholesale prices should be retained.

Among the indicators of planning great importance belongs to the economic impact from the introduction of new technology, which is defined as the difference between the upper and lower limits of the wholesale price for production engineering products. When establishing the price for them some economists propose to retain the upper limit of only the rough estimates and to define the wholesale price itself as the sum of its lower limit and the markup for product quality. Such a suggestion results from the fact that in economic practice the planned impact is often not achieved in connection with the fact that the lower limit of the price plus the expenditures on the assimilation of the new technology are often greater than the upper limit.

However, the amount of the economic impact exists objectively, and, in our opinion, it must not be rejected. It is determined not only by the current results of the economic operations of enterprises, but also by the impact which the sector and the national economy as a whole obtain from the introduction of a fundamentally new technical invention. In a number of sectors of industry the national economic impact from the production and introduction of new technology exceeds by tens of times and more the expenditures on its development.

At the same time the negative factors, owing to which the obtained impact often does not correspond to the planned impact, should be taken into account. As the work experience of enterprises attests, this occurs first of all because the economic impact is not set down in documentary form as a contract between the client and the developer of the new technology, while such a contract should be signed by both parties. Taking advantage of this, the developers of the ministries producing the product overstate the economic impact on the average by 30-50 percent, and for some types of products by twofold, due to which the enterprises of the ministries which use these products suffer. Such a state of affairs forms, in case of which there is only a planned, and not a real impact due to the overstatement of the lower limit of the price with allowance made for the markups and the expenditures on the assimilation of the new technology. While obtaining price markups, enterprises often do not guarantee the quality of items, which is required by the standards and specifications, which leads to a decrease of the real amount of the economic impact. Not without reason have manufacturing enterprises of late not received the entire amount of the price markups due to them.

So that in the future the economic impact from the introduction of new technology would increase according to the plan, it is necessary for the USSR State Committee for Prices, in our opinion, when elaborating new wholesale price lists to implement a number of measures:

to stimulate the production of new technology primarily by wholesale prices, which have been differentiated subject to the technical and economic characteristics and have been elaborated with the use of standard parametric methods;

to strictly confine the upper limit of the price to the limit price, which is elaborated at the stage of the designing of the new product;

to link the lower limit of the price with its decrease after the expiration of the date of the assimilation of the new technology, which will make it possible in the case of a fixed value of the upper limit to increase the real economic impact.

Under these conditions the planned amount of the economic impact will become the standard amount which will stimulate the producer and designer of new technology in conformity with the contract subject to the extent of the increase of the real amount of the impact. In our opinion, this will substantially increase its amount and, consequently, the contributions to the economic stimulation funds of both the institutes which developed the new technology and the manufacturing plants.

In this connection the planning of production according to the indicator of the standard net output, which does not take into account the expenditures of past labor, is of great importance. Here the main task is to prevent the reduction of the output by enterprises of products which are material-intensive, but are needed by the consumer. Hence it follows that it is necessary to increase the attention toward the standardization of the material expenditures on the output of products.

Moreover, it is necessary to take into account that the conversion of enterprises to the indicator of the standard net output is creating the conditions for the output of labor-consuming products with a high proportion of expenditures of manual labor and, on the contrary, does not stimulate the introduction of material-intensive processes, particularly the mechanization and automation of production. Therefore it is also necessary to increase the attention toward the standardization of the labor expenditures on the output of products and toward the elaboration of economically sound standards of the labor-output ratio. It is necessary to calculate the standards of the net output so that they would take into account the sectorial conditions of production, including the average expenditures of living labor for the sector, which are determined according to the procedure, which was established when forming the wholesale prices, on the basis of advanced norms of the labor-output ratio.

From the standpoint of pricing the question arises of the subsequent recalculation of the standards of profitability with respect to the standard net output, that is, in essence, the changeover to a new basis of pricing. As is shown by the experience of the ministries which have changed over to the evaluation of the work of enterprises according to this indicator, for example, the USSR Ministry of Machine Building for Light and Food Industry and Household Applicances, the different level of profitability by types of products with such a method of pricing can increase, which can result in the aspiration of enterprises to produce labor-consuming products to the detriment of material-intensive products. This especially pertains to the sectors of industry, in which instruments and equipment are produced from expensive types of raw materials and materials, the use of which means an increase of the durability and reliability and an improvement of the other characteristics of the product. Therefore when introducing the indicator of the standard net output it is necessary to increase the attention toward the standardization of both the material and labor expenditures on the output of products and to raise it to a higher level.

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RESOURCE UTILIZATION AND SUPPLY

FURTHER MECHANIZATION OF WAREHOUSING URGED

Moscow MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE in Russian No 4, Apr 81 pp 26-29

[Article by M. Kuz'min, deputy chief of the Technical Administration, USSR Gossnab: "Advanced Technology for Warehousing Services"]

> [Text] Major and complex tasks have been set for USSR Gossnab organs in the present five-year plan. Solution of these tasks is inconceivable without assimilation of scientific and technological achievements, including mechanization and automation of loading and unloading and transport and warehousing operations throughout the entire movement of freight. Only in this way can the shipment of products from suppliers to consumers be expedited, losses be reduced, and the number of workers employed in these operations be decreased. This is why it is very important for the USSR Gossnab to expeditiously carry out the program to assimilate advanced warehousing technological processes in supply, industry, construction and transport, utilizing extensively economical forms of containers and packaging.
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> This task is an important integral part of the state program to develop the complex mechanization and automation of materials handling and warehousing operations and to create highly effective systems of machines and equipment which provide for significant reduction in the proportion of hard physical labor in these operations.

For practical implementation of the program outlined by the USSR Gossnab, 54 scientific research institutes, as well as many associations, organizations and enterprises of various ministries and departments have been included.

In conformity with the first target, preparation of standardized ranges of packaging and specialized containers for different forms of output has been completed. GOST [All-Union State Standard] 23238-78 on "Long freight; Transport packages; Types, basic characteristics and dimensions; Technical requirements" has been drafted and approved. A plan of organizational and technical measures for introduction of the GOST, including proposals related to delivery of products under special conditions and development of technical means for storing and handling long freight, has been approved by the USSR Gossnab. GOST's have been prepared on the charerteristics of freight which is shipped crated or by the piece [tarno-shtuchnyye gruzy], of containers and tanks for liquid and bulk materials, and on other aspects.

The most important task is the establishment and development under experimental-industrial conditions, based on standardized ranges of packaging and containers, of advanced standardized technological processes for warehouse handling and shipment of freight which provide for complex mechanization and automation of loading and unloading and warehousing operations. Taking into account the specific nature of the warehouse handling of different forms of output, this task has been divided into seven categories: crated and separate pieces of freight; ferrous metals; nonferrous metals; sanitary engineering, asbestos cement, and ceramic articles and pipes; bulk chemical materials; liquid chemical products; and coal.

The preparation of technological processes for the warehouse handling and packaged delivery of crated and separate pieces of freight, depending on the shape and dimensions of the packaging, is being worked on by 12 institutes of different ministries and departments. At present, a number of new technological processes for the handling of crated and separate pieces of freight have been prepared by these organizations, based on the use of containers and a definite selection of machinery and equipment.

All these technological processes have been classified according to the size of the batches of a product, its uniformity, and the turnover rate of stocks of the product which are arriving and being shipped out in containers. The proposed technological processes have been approved at 14 machine building enterprises and in four main territorial administrations of the USSR Gossnab. Standard technological processes have been examined by an expert commission of the Scientific and Economic Council and after elaboration they will be submitted for approval to the USSR Gossnab management.

According to the data of Orgsnab [expansion unknown], the experimental-industrial assimilation of standard technological processes for warehouse handling of crated and separate pieces of freight in the system of the USSR Gossnab will provide a savings of about 20 million rubles, including about 7 million for construction materials and sanitary engineering equipment and 4.3 million rubles for products of the machine tool industry.

Improvement in the technological processes for the warehouse handling and packaged delivery of ferrous metals (small- and medium-sized rolled products and pipes with a diameter of up to 159 millimeters) is very important for ferrous metallurgy enterprises. The DonNIIchermet [Donetsk Scientific Research Institute of Ferrous Metallurgy], jointly with the NIIAchermet [expansion unknown], has developed technological processes for the packaged delivery of ferrous metals and has conducted their experimental-industrial incorporation at the Western Siberia, Cherepovets and Magnitogorsk metallurgical combines, as well as at 18 enterprises of the USSR Gossnab system, including enterprises of metal products supplies in Gor'kiy, Ufa, Zaporozh'ye and Cheboksary. The annual gain from use of these technological processes in the USSR Gossnab system has amounted to over 350,000 rubles.

The shipment of fagoted [paketirovannyy] ferrous metal through the seaports of Odessa, Klaypeda, and Rostock (GDR) by means of the technology proposed by the SoyuzmorNIIproyekt Minmorflota [State Planning, Design and Scientific Research Institute of Marine Transportation of the USSR Ministry of the Maritime Fleet] has made it possible to more than double the increase in labor productivity in materials handling and transport and warehousing operations and to reduce railway car and ship layovers.

Based on experimental-industrial introduction in 1980, the development of packaged shipment of ferrous metals has been stipulated for broad assimilation in the country's national economy. Similar technology has been prepared by the Artemovsk branch of the Giprotsvetmetobrabotka Mintsvetmeta SSSR [State Scientific Research and Planning Institute of Alloys and Nonferrous Metal Processing of the USSR Ministry of Nonferrous Metallurgy], jointly with Orgsnab, for rolled nonferrous metals (pipes and rods up to 6 meters long, wire in coils, bands and belts in rolls, and so forth); at present this technology is being incorporated at the Artemovsk Nonferrous Metal-Processing Plant imeni Kviring as an experiment for the delivery of packaged nonferrous metals to the Bezlyudovka Enterprise for Metal Product Supplies of the Khar'kov territorial administration. Its estimated annual impact, with delivery of 38,000 tons of nonferrous metals, amounted to about 40,000 rubles for the Artemovsk plant and about 60,000 rubles for the Bezlyudovka enterprise. I would like to mention that the USSR Ministry of Nonferrous Metallurgy has approved measures for introduction of these technological processes at nine enterprises in the sector in the 1981-1985 period.

Technological processes for the packaged shipment of sanitary engineering, asbestos cement and ceramic products and pipe have been approved at a number of plants and combines of the USSR Ministry of the Construction Materials Industry, as well as in main territorial administrations of the USSR Gossnab: the Volgo-Vyatskoye, Tatarskoye, and Vologodskoye. The annual economic gains amount to 1.5 million rubles. Packaged shipment of about 1 million tons of construction materials is being introduced by the Ministry of the Maritime Fleet, which will make it possible to obtain economic gains of more than 2 million rubles and release up to 3,000 workers from hard manual labor.

Technological processes for the warehouse handling and container shipment of bulk materials have been proposed by the Tula branch of the Giprokhim [State Institute for the Planning of Plants of the Basic Chemical Industry] and Orgsnab. Their experimental-industrial introduction has been implemented for the shipment of mineral fertilizers from the Maardu Chemical Plant to consumer enterprises in the Estonian SSR, as well as at enterprises for deliveries of the output of the Volgo-Vyatskoye Main Territorial Administration. The annual economic gains have amounted to over 70,000 rubles. Taking this favorable experiment into account, the Ministry of the Chemical Industry has approved a plan for their broad assimilation in the sector's enterprises in the 1980-1985 period. Technological processes for warehouse handling, taking container shipment of bulk and liquid chemical materials into account, have been reviewed by an expert council of the Scientific and Economic Council of the USSR Gossnab. Orgsnab and the Tula branch of Giprokhim have been charged with expanding and submitting these developments for approval to the management of the USSR Gossnab.

The warehouse handling and shipment to consumers of liquid products (acids, alkali, lacquers, solvents, resins, drying oils) from supply and sales enterprises, especially in small batches, using low-tonnage specialized containers, are highly labor-intensive. Technological processes developed by Orgsnab have been introduced in the Latvian SSR Gossnab and the Tatmashkhimsnabsbyt [expansion unknown] of the Tatarskoye Main Territorial Administration.

The UkrNIIproyekt Minugleproma SSSR [State Scientific Research and Planning Institute of Coal, Ore, Petroleum and Gas Industries of the Ukrainian SSR of the USSR Ministry of the Coal Industry] has prepared technological processes for the warehouse handling of coal, providing for improvement in labor productivity and the efficiency of interaction of industrial and mainline rail transport. Their experimental assimilation has been implemented at a number of mines. Calendar plans for further assimilation of these technological processes have been approved by an order of the USSR Ministry of the Coal Industry. Their implementation, according to estimates of the USSR Ministry of the Coal Industry, will make it possible to obtain annual economic gains amounting to 4 million rubles.

Advanced technological processes for the complex mechanization and automation of materials handling and warehouse operations, based on broad use of packaged and container shipment of freight, cannot be implemented without creating and putting into production a complex of machinery and equipment. Their production is being carried out at 390 enterprises of 40 ministries and departments. However, the national economy's demand for such means of mechanization and automation is not being fully met.

Experimental-industrial models of a line for packing copper cathodes and standardized ingot-stackers [chushkoukladchiki], which already have been put into use at a number of plants, were manufactured and given test-stand trials by the USSR Ministry of Nonferrous Metals in 1979. The special design bureau for metals of Giredmet [State Scientific Research and Planning Institute of the Rare Metals Industry] has determined the sector's requirement for the machines mentioned for the 1981-1985 period. Technical specifications have been drafted by the VNIImekhchermet [expansion unknown] for the manufacture of machinery for transversal and longitudinal binding of packages of hot-rolled sheets and baled rolled products, in accordance with which experimental-industrial models of the machines have been manufactured and put into operation at the Dnepropetrovsk experimental plant. In 1979 an adjustable series of package-binding equipment was manufactured at the VNIImekhchermet experimental plant for the "1700" continuous mill of the Zhdanovsk Metallurgical Plant imeni Il'ich. Blueprints have been transmitted to the Novo-Kramatorskiy Machine Building Plant imeni V. I. Lenin for the manufacture of an adjustable series of these machines for the "2000" mill again being built at the Volgograd Krasnyy Oktyabr' Metallurgical Plant. Production of the A-9-KShZh stacking machine has been begun by enterprises and organizations of the Minlegpishchemash [Ministry of Machine Building for Light and Food Industry and Household Appliances] at the Leningrad production association Lenprodmash [expansion unknown].

A number of manually operated band-fastening machines for the mechanized binding of crates and packages have been set up at the VNIEKITU [All-Union Scientific Research and Experimental Design Institute of Containers and Packaging]; the national economy's requirement for them has been determined, and small-series production has been organized at an experimental plant.

For transporting chemical products, first packaged in bags, specialized pliable containers of polyethylene have been developed at the "Polymerkonteyner" plant in modern Moscow. The economic gains from their introduction will amount to from 3 to 5 rubles per ton of output transported.

Mass production of stitched [niteproshivnyye] materials is being organized at enterprises of the Soyuzplastpererabotka [expansion unknown]. Their use will make it possible to save 10 to 20 rubles for each ton of output transported.

Designs, blueprints, production technology and standardized technical documentation have been developed for multiple-use packaging [mnogooborotnaya tara] of (rezofan)and its production has been organized at an experimental plant of the VNIEKITU. The multiple-use moisture-resistant packaging has found application in different industrial sectors. In 1979, 13,000 units of this packaging were made, and 30,000 units were manufactured in 1980.

A significant amount of work has been carried out to establish technical documentation on packaged shipments for projects used for storage purposes. Thus, countrywide norms have been prepared for the technical project-planning of warehouses which handle packaged and separate pieces of freight; they were approved by the USSR Gossnab in 1977 under an agreement with the USSR Gosstroy and the State Committee for Science and Technology. Countrywide norms of technical project-planning for lengthy articles which are shipped as packages and in containers were approved in October 1977. These norms are a single standardized document used in planning warehouse projects for scientific research, planning and design, and industrial organizations.

The Statute on the procedure for circulating multiple-use packaging resources in the national economy, approved by decree of the USSR Gossnab and the USSR Gosarbitrazh [State Arbitration Commission], was drafted by the technical administration and the contract and legal division with arbitration of the USSR Gossnab, jointly with the Institute of Complex Transportation Problems of the USSR Gosplan. It went into effect on 1 July 1980. The statute stipulates the procedure for circulating multiple-use packaging materials, which is mandatory for all production associations, enterprises, and supply and sales, trading, transport and other organizations regardless of their departmental subordination which use general-purpose and specialized multiple-use packaging materials for the packaged supply, loading, unloading and storage of freight. Packaging materials used for the packaged supply, loading, unloading, and storage of freight must conform to state and sector standards or technical conditions approved in the procedure specified. Deadlines for returning packaging materials, the amount of fines for violating these deadlines, for their damage or loss, compensation to consignors for packaging costs, and so forth have been established.

Problems related to determination of the range of products which should be shipped in packaged form are very important. With this objective, the VNIEKITU, jointly with the USSR Gossnab Technical Administration and concerned ministries and departments, developed a listing in accordance with the All-Union classifier which was approved by a USSR Gossnab decree on 16 January 1980. Ministries and departments manufacturing products which are subject to packaging have been asked, for example, to develop and approve measures which ensure reduction of the time periods until unloading of the products mentioned with transport packaging. Their implementation is stipulated in plans of the appropriate ministries and departments in the 1981-1985 period.

In accordance with the goals approved, the VNIEKITU of the USSR Gossnab, jointly with industrial sectors, has determined the requirement for containers and packaging materials for the period up to 1990. Proposals have been worked out to replace a number of traditional packaging materials made of wood with improved materials. In particular, a special pressboard which yields significant economic gains will be widely used. Results of these tests have been used by the Soyuzglavtara [Main Administration for the Reuse, Supply and Sale of Packaging] in drafting plans for development of the production of improved forms of packaging for the 11th Five-Year Plan. Experimental shipments of fruits and vegetables were made for the VNIEKITU from the field to the consumer on box pallets, which produced favorable results. About 250,000 such box pallets were manufactured at enterprises of the RSFSR Ministry of Trade and the RSFSR Ministry of Local Industry in accordance with GOST 21133-75.

Measures for introducing advanced technology in the packaged shipment of sanitary engineering, asbestos cement, and ceramic products and pipe to consumers in the 11th Five-Year Plan period and in the future up to 1990 have been drafted by the USSR Gossnab and the USSR Ministry of the Construction Materials Industry. Organization of the packaged shipment of just the mentioned forms of output will make it possible to triple labor productivity, release for the national economy more than 5,000 workers engaged in hard physical labor, and significantly reduce the losses of freight in shipment and storage. The annual economic gains from introducing the program mentioned are more than 12 million rubles.

However, the rates at which the advanced technological processes for warehouse operations and shipment of products in packages and containers that already have been developed are being introduced are obviously inadequate.

These matters often are not resolved completely in ministries and departments—the manufacturers of products—but on the basis of departmental interests.

The absence of a single technical policy in creating the necessary equipment on a high technical level and correct coordination in distributing these facilities leads to a significant lagging in the shipment of products in packaged form and in containers (20 to 25 percent of the requirement).

It should be noted that full mechanization and automation of materials handling and warehousing processes resolve not only economic problems, but important social ones as well. Thus, 1 million tons of freight shipped in packaged form and in containers yields economic gains of more than 3 million rubles, increases labor productivity five to six times, and releases about 1,500 persons from hard physical labor.

Orgsnab, as the main organization, has not displayed the proper urgency and aggressiveness [boyevitost'] in work with ministries and departments on the qualitative fulfillment of the assignments of full mechanization and automation of materials handling based on wide use of the packaged and containerized shipment of freight. It is necessary for the technical administration to establish continuous and active supervision over the course and quality of operations conducted.

Analysis of the fulfillment of targets has shown that in the 1981-1985 period it is necessary to carry out new research, planning and design efforts and to put them into effect, and to continue classification by type and standardization of both the new advanced technological processes and those created earlier which provide for full mechanization and automation of materials handling and warehousing operations based on packaging and containerization.

With these objectives, the USSR Gossnab Technical Administration, jointly with the intersectorial coordination division of Orgsnab, has drafted a program for 1981-1985 which includes further development of advanced technological processes in warehouse operations with the use of packaged and containerized shipment of products from the producer to the consumer, ensuring full automation and mechanization of freight handling. Its implementation will make it possible to increase labor productivity 2 to 2.5 times and to release about 60,000 workers from hard physical labor.

Successful resolution of this most important statewide problem depends to a great extent on the combined, purposeful activity of USSR Gosplan organs as well as all concerned ministries, departments, and scientific research and design organizations. In the Central Committee Report to the 26th CPSU Congress, Comrade L. I. Brezhnev stated: "We need to increase personal demand from managers of departments, enterprises and institutes for the production of new forms of output, the introduction of new advanced technology. We need to eliminate everything that makes the process of introducing what is new difficult, slow and painful. Production should be vitally concerned about assimilating the fruits of the labor of scientists and designers more rapidly and better. Solution of this problem is, of course, not a simple matter; it requires breaking old habits and indicators. But it is absolutely necessary for the country, for the people, for our future."

Wide assimilation in the national economy of advanced technological processes for warehouse handling of freight, the creation of highly efficient systems of machinery and equipment which provide for significant reduction in the proportion of hard physical labor in these operations will promote further development of mechanization and automation of materials handling operations and the packaged shipment of products in all sectors of industry, in construction, in transport, and in the system of material and technical supply.

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RESOURCE UTILIZATION AND SUPPLY

GOSSNAB CALLS FOR GREATER RESOURCE CONSERVATION

Moscow MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE in Russian No 5, May 81 pp 71-73

/Article by V. Il'inskiy, chief of the Main State Inspectorate for the Surveillance of Use of Material Reserves, USSR Gossnab: "Reinforcing the Policy of Economy"; passages enclosed in slantlines printed in boldface/

> /Text/ Our economy consumes vast quantities of raw material, materials, and fuel and power resources. Under these conditions, solution of the principal task of the 11th Five-Year Plan--providing for a further increase in the welfare of the Soviet people--depends to a considerable extent on how consistently a policy of economy is carried out. And this is clear. Preservation of national wealth is the most effective way to reduce public expenditures and raise the workers' living standard.
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> In the CPSU Central Committee Report to the 26th party congress, Comrade L. I. Brezhnev, general secretary of the CPSU Central Committee, noted: "...our further movement forward will depend to an ever greater extent on skillful and efficient use of all available resources--labor, fixed capital, fuel and raw materials, products of the fields and farms." In the 11th Five-Year Plan we will be faced with devoting particular attention to the strictest observance of state discipline, the struggle against mismanagement and waste, and implementation of a system of measures aimed at reducing various losses and waste products. All this requires further intensification of supervision by Gossnab central and local organs over the use of physical resources and identification of the deep reserves of economy.

The Main State Inspectorate of the USSR Gossnab carries on work continuously to reinforce the policy of economy in the national economy. It is sufficient to say that last year alone about 10,000 inspections were made of the use of physical and fuel and power resources at the enterprises of various ministries and departments, and more than 2,000 inspections were made in kolkhozes and sovkhozes.

Systematic supervision over the use of physical resources is conducive to reinforcement of the policy of economy. The majority of enterprises and construction projects have provided for fulfillment of targets in accordance with an average reduction in the norms of rates of consumption, and have made savings in rolled ferrous metals, fuel, and thermal and electric power. In the national economy as a whole last year, more than 70,000 tons of standard fuel, more than 10 billion kilowatt-hours of electric power, nearly 15 million gigacalories of thermal energy, and much rolled ferrous metal were saved in comparison with established norms.

At the same time, inspections show that the effectiveness of supervision must be improved. At many enterprises and construction projects, waste and mismanagement are still being tolerated, material valuables are stored unsatisfactorily, rates of consumption are overestimated, discipline in the use of funds is violated, and overexpenditure of fuel, thermal and electric power, and rolled ferrous metals is tolerated. Side by side with the savings achieved as a whole in industrial sectors, construction and transport, a number of enterprises last year overspent 5.5 million tons of standard fuel. All this attests to the significant reserves which must be brought into use.

Achievement of substantial savings in fuel and power resources, rolled metal, lumber and cement, and a reduction in the rate of consumption of rolled ferrous and nonferrous metals and steel pipe in machine building and metal working have been stipulated as Basic Trends in the 11th Five-Year Plan. /Solution of these crucial tasks requires that the USSR Gossnab and territorial organs not only intensify supervision, but improvement in all work to bring about efficient use of physical resources in the national economy./

First of all, it is necessary to substantially improve norm setting for the input of materials, to systematically review outdated norms and introduce advanced ones, to reinforce their mobilizing role in implementing a policy of economy, and to improve the quality and effectiveness of accounting and state statistical accountability. Significant reserves for economy have been established here. Today, for example, output being allocated by the USSR Gossnab is not reflected in state statistical accountability because there simply is no such accountability. Meanwhile, goals for economy in this output are being established. The question arises: how can their fulfillment be supervised, and how can consumers who incorrectly utilize the output in the products list of the USSR Gossnab be influenced? There is only one answer here—develop such accountability.

The important task consists of establishing assiduous supervision over fulfillment of targets in accordance with an average reduction in the rates of consumption of basic forms of physical resources, over implementation of organizational and technical measures which provide for economy by each enterprise, association, ministry and department.

Thus far such supervision is insufficiently effective. And one of the reasons for this, in our view, lies in the fact that the accountability of form 12-SN, in accordance with which enterprises render an account of savings in resources over the past year, is submitted once a year. Moreover, receipt of accountability is stretched out from July to December of the following year. This does not make it possible to practically analyze the data and to expeditiously bring influence to bear on those who permit shortcomings in the use of resources.

The effectiveness of supervision would be much greater if enterprises submitted information on savings in accordance with form 12-SN even if only once every 6 months. In our opinion, the state statistical organs should first work out such accountability for ferrous and nonferrous metals. It is especially important to do this because the target has been set in the 11th Five-Year Plan to significantly increase the coefficient for the use of metal. At many machine building enterprises, it does not exceed 0.5-0.6 percent at present. This means that 40 to 50 percent of the metal is being used up unproductively.

It is necessary to bear in mind that it was established for the first time in the national economic plan for 1981 that one of the basic indicators is the coefficient for the use of ferrous metals. On the average, its increase is envisaged up to 0.73. An increase in the coefficient by one point just in machine building will reduce the input of metal by 360,000 tons.

/Here is a broad field of activity for the appropriate sectorial administrations, soyuzglavsnabsbyty [main administrations for supply and sales], and territorial organs. In this work much also depends on ministries, departments, production associations, and enterprises, the efforts of which should be directed at maximum use of practical metal scrap, utilization of low-waste processing methods, the introduction of advanced methods of metal working, and reduction of defective output./

Significant losses of metal result from violations of the rules for its conservation and the absence of covered storage areas at many enterprises. For this reason, for example, about 2,000 tons of metal have been ruined in a year as a result of corrosion at just the plants of the Ministry of the Automotive Industry, the Ministry of the Electrical Equipment Industry, and the Ministry of Construction, Road and Municipal Machine Building.

In order to prevent deterioration of valuable construction materials, warehouses must be built. Territorial supply organs should exercise particular supervision over construction of metal storage areas at enterprises and in organizations.

Most serious attention also should be given to the use of practical metal scrap. At present, a significant amount of scrap goes to remelting at best; at worst, it is sent to a dump. It seems expedient for the gossnabs of union republics and main territorial administrations, jointly with representatives of ministries and departments, to establish for each enterprise located in their region of activity an inventory of the wastes which it is necessary to consider practical and the amount of by-products which can be used to turn out items with a production purpose and consumer goods. By virtue of this alone, 2 to 3 percent of the metal can be saved every year.

Implementation of measures to eliminate losses in industry, construction, transport and other sectors has been stipulated by the Basic Trends. It is especially important that large losses of physical resources are permitted during storage and shipment. Moreover, for certain forms of resources, particularly coal, oil and electric power, these losses are increasing from year to year and the rates of their increase are outstripping the rates of increase for their extraction and production. /This is why it is important for USSR Gossnab organs to carry on continuous and painstaking work with ministries, departments and enterprises to bring about a reduction in the extent of losses./

The reserves here are vast. As an example, about 2.7 million tons of valuable construction material is lost during the shipment of cement by rail and in transshipments. Perhaps these losses are unavoidable? Not at all. Thus, much cement is lost as a result of poor maintenance of rolling stock. The cars have openings which are cleaned poorly. Because of the lack of special rolling stock, the cement often is transported in open cars, and part of it, in the full sense of the word, is dusted away.

It is necessary to take urgent measures to prevent the loss of cement. There is no doubt that some measures, let us say, related to the output of modern means of transportation, loading facilities and machinery, and an increase in the number of shipments in special cars cannot be resolved in the course of several months. They will require thorough analysis. The Ministry of Railways, the USSR Ministry of the Construction Materials Industry, and the Ministry of Heavy and Transport Machine Building, as well as the administrations for transportation, supply, and intersectorial relations of the USSR Gossnab should express their opinions.

But there also are measures which can be implemented today. Basically, this relates to our territorial organs. For example, they can and should make an inventory of warehouses for storing cement at enterprises and in construction organizations, and develop, together with consumers, organizational and technical measures to eliminate losses of the valuable material. Territorial organs have wide authority. They have the right to stop delivery to those consumers who use cement wastefully. Unfortunately, the main territorial administrations seldom adopt such sanctions at present. Such liberalism in relations with consumers who are wasters does not help matters.

In the Basic Trends, the necessity of broad involvement in economic turnover of secondary fuel and power resources, as well as by-products, is emphasized. There are significant reserves available here. It is enough to say that just for 10 of the most fuel- and power-consuming ministries (USSR Ministry of Nonferrous Metallurgy, USSR Ministry of the Construction Materials Industry, and others), 17 percent of the thermal secondary resources are underutilized. At the same time, in comparison with 1978, the use of secondary power resources in the ministries mentioned decreased by approximately a million tons of standard fuel. The task of putting these reserves at the service of the national economy is not easy, but it is feasible. For its successful solution, it is required to reinforce work on the organization of efficient use of these resources and improve the effectiveness of supervision by ministries and departments and the central and territorial organs of the USSR Gossnab.

/An important role in reinforcing the struggle for efficient use of physical resources has been assigned to development of an efficient system of economic incentive for saving them and responsibility for squandering them./ Much work lies ahead. The fact is that many conditions of the system in operation have become outdated. For example, the procedure and conditions for payment of bonuses to workers of enterprises for fulfillment of targets for saving ferrous metals were approved in 1973 and extended to 1 January 1981. It is now necessary to introduce substantial amendments to these documents in the light of the Basic Trends.

The procedure for applying economic sanctions for wasteful use of physical resources also needs improvement. USSR Gossnab organs have been granted the right in individual cases to reduce the funds for materials for the enterprises which violate fund discipline. In this connection, there is an order of the USSR Gossnab. The general conditions are contained in it. But for USSR Gossnab organs to make use of the right granted, it is necessary to give concrete expression to these conditions and to clearly regulate how main administrations for supply and sales and territorial administrations should proceed. That is, a document is needed which explains the authority of our organizations in applying sanctions. However, there is no such document to date. As a result, the effectiveness of influence on enterprises which consume physical resources inefficiently is reduced.

It appears advisable to expand the rights of inspection workers related to making managers of enterprises and organizations answerable for violation of state discipline and inefficient use of resources. This is what I would like to stress. At present, economic sanctions are applied for release of a product without a job authorization only against the "giving" enterprises which release physical resources in violation of established procedure. In our view, this is a half-measure. It is necessary that the "taking" enterprises which acquire resources without job authorizations also bear economic responsibility. In addition, it is advisable to extend sanctions to those consumers who permit overexpenditure and do not use materials for their real purpose. The right of supply and sales organizations to reduce or cancel funds allocated to consumers in cases when resources are used inefficiently needs to be legalized.

/There is no doubt that all these measures will have full effect only if supervision over the inefficient use of physical resources (and under this, in the broad sense of the word, we understand organization of work on savings) begins to be exercised not only by employees of the Main State Inspectorate and territorial organs, but all subunits of the USSR Gossnab without exception./ An important task has been advanced by the Basic Trends—to strengthen and improve the statewide system of material and technical supply and to increase its role and responsibility for the efficient use and economy of physical resources. In this connection, the sectorial administrations, main administrations for supply and sales, and territorial organs should not only fulfill the unquestionably important function of alloting resources to consumers, but exercise an active influence on their efficient use in the national economy as well.

The Main State Inspectorate and the inspectorates of territorial organs are faced in the 11th Five-Year Plan with seriously improving work connected with ensuring economical consumption of resources in the national economy. Inspectorates are being expanded and are receiving new functions and rights, making it possible to reinforce the effectiveness of inspections and improve their quality. We see one of the most important tasks as thorough coordination of the activity of all subunits involved in the saving of resources. The guarantee of successful work to improve consumption of physical resources in the national economy is precisely through concerted actions by the organs of supervision and all other subunits of the USSR Gossnab.

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ECONOMIC MODELING AND COMPUTER TECHNOLOGY APPLICATION

MODELING REGIONAL TECHNOLOGICAL PROGRESS PROGRAMS

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR--SERIYA OBSHCHESTVENNYKH NAUK (3 series per yr) in Russian No 1, Jan 81 pp 60-64

/Article by V. L. Kvint, Krasnoyarsk Department of the Institute of Economics and the Organization of Industrial Production of the Siberian Department of the USSR Academy of Sciences: "The Elaboration of Regional Programs of Scientific and Technical Progress"/

/Text/ The gains made in developing the economic potential of the USSR in meeting the increasing material and spiritual demands of the Soviet people are based to a considerable extent on the use of the achievements of scientific and technical progress.

The increase of the relative shortage of manpower resources and the tendency noted in recent years for the growth rate of capital investments to decline are making inevitable and necessary the transformation of the extensive variant into nothing more than a fragment of the intensive development of the economy of the country. Against the background of these economic processes the successful solution of the problems of the further strengthening of the fuel and power base and the accelerated commitment to the national economic turnover of the natural resources of the regions of pioneer industrial development is leading to the increase of the importance of scientific and technical progress.

The studies of the problem of combining the territorial and the sectorial approaches to the management of scientific and technical progress and the practical testing of their results assessed regional scientific and technical programs as an effective tool of the solution of these problems. Such programs are being elaborated in the USSR and in a number of union republics and oblasts. So far this idea has been realized in most complete form in Krasnoyarskiy Kray, where a comprehensive regional program of the accelerated introduction of the achievements of scientific and technical progress in the economy of the kray for 1981-1990 has been elaborated.

The gained experience and the performed research are making it possible to formulate the main methodological and procedural approaches which should be taken into account when elaborating regional scientific and technical programs. As is known, in conformity with the decisions of the 25th CPSU Congress more than 200 scientific and technical programs, the implementation of which the USSR State Committee for Science and Technology is monitoring, have been elaborated for the first time in addition to the state five-year plan. Experience has shown the need for their regular elaboration for a period, as a rule, of not less than 10 years. The regular elaboration of a comprehensive program of scientific and technical progress for 20 years, which should be updated and refined every 5 years, has been introduced in conformity with the July (1979) decree "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality." These problems, while considerably broadening the horizon of centralized planning, should be made more specific not only with a breakdown by sectors, but also on the regional level. The regional scientific and technical programs should also be examined in this connection. In our opinion, the reflection in them of the regional features of scientific and technical progress in principle makes it possible to reveal the local reserves of the increase of its effectiveness. Thus, in Krasnoyarskiy Kray the regional scientific and technical policy should consistently take into account the shortage of manpower resources and the greater (as compared with other regions) effectiveness of the replacement of living labor by machines. On this basis a single goal for the hundreds of enterprises of the kray--the assurance of a labor-saving scientific and technical policy--was made the basis of scientific and technical progress in the region.

The orientation toward a single goal, in our opinion, is a decisive condition of the successful elaboration and implementation of regional scientific and technical programs. Hence, also, the criteria of the appraisal of the corresponding plans and measures: the indicators of the conditional and actual release of workers with allowance made for the social effectiveness of the program (the improvement of working conditions and the increase of its safety). The annual economic impact from the implementation of a program, of course, depends on the volume of additional output, which is obtained due to technical and technological changes. As has been established, the implementation of regional scientific and technical programs in Krasnoyarskiy Kray is making it possible to save the labor of more than 200,000 people. In practice this means that the need to attract several hundred thousand people from other, more habitable regions of the country is disappearing. Meanwhile, as estimates show, the settlement of each of the newcomers to the regions of pioneer development in the kray costs 17,000-20,000 rubles.

The policy of achieving a labor-saving impact is not only the offsetting of the shortage of manpower resources and the removal of workers from production sectors which are notable for harmful, difficult and dangerous working conditions: the extensive automation of production and the introduction of robotized technologies, instrument-controlled technologies, technologies with few operations and other advanced technologies are leading to a sharp increase of the demands on the skill of engineers and workers, to the change of the ratio between mental and physical labor, to the change of the content and the increase of the creative nature of labor.

All this requires the activity, which is coordinated with respect to time and resources, of many collectives: of scientific research, design, planning, production and construction organizations. For example, 48 organizations and enterprises are taking part in the preparation of the program on the introduction of technology of northern design, which is one of the components of the Krasnoyarsk Comprehensive Regional Scientific and Technical Program. The results of the research and development will be introduced at production associations and enterprises, which represent 11 ministries. This component alone of the comprehensive regional scientific and technical program is making it possible to provide an annual economic impact of more than 10 million rubles and to release about 10,000 people.

By coordinating and cooperating with respect to time, material, financial and manpower resources and the achievement of the ultimate goal the efforts of organizations which represent all the sectors of the economy, the regional scientific and technical program can ensure the conformity of the necessary measures to the plan with the combination of the interests of the individual sector and the region.

In the sectorial plans the specific regional nature of the scientific and technical policy is poorly taken into account, a set of measures in this direction is not envisaged. The analysis of the fulfillment of the plans of introducing new technology at the enterprises of the kray attests that the existing system of plan indicators is inefficient and obsolete and does not meet the tasks of the day. Meanwhile, regional scientific and technical programs in principle make it possible not only to make the path of a scientific development to its users shorter, but also to substantially streamline the process of introducing new technology and to approach comprehensively the organization of its management. In this connection a procedure of planning should be developed, in case of which the plans of the introduction of new technology and the assimilation of a new processing method and materials would be integrally coordinated with the plans of production and capital investments and would find reflection in the material, capacity, financial and manpower balances.

The experience of studying the problems of scientific and technical policy under the conditions of Krasnoyarskiy Kray, it seems, will also be useful for other regions of pioneer development and the intensive modernization of the economy. The assurance of completeness, the coordination of regional and sectorial interests, the inclusion of the regional scientific and technical programs in the state plans--it is necessary to provide for all of this from the very start of the elaboration of regional scientific and technical programs. An organizational and economic mechanism of management, which makes it possible from the start to the finish to combine in a single whole the scientific, technical, economic and social factors, while overcoming departmental and local interests in the use of resources, is necessary for this. In our opinion, the management of the implementation of the program should be carried out by augmenting one-man management with a collective form of coordination. The planning organs of the krays and oblasts could become the coordinating organs of the implementation of regional scientific and technical programs, for which they should be granted more extensive powers. Within these organs it would be possible to set up departments of the territorial planning of scientific and technical progress.

In planning practice of recent years there has been noticed an interest in the elaboration of scientific and technical programs, with their orientation toward the end results and the distinction of the individual stages of the solution of the corresponding problems. The gradual changeover from individual state acts on the elaboration and management of regional problems to their basic inclusion in the national economic plan seems timely. The goals and tasks of the program should be coordinated with the goals and tasks of the national economic plans and should have a complete resource substantiation in the plan estimates and indicators. Here in principle it is possible to estimate the influence of the regional scientific and technical program on the functioning of the economy and the achievement of the ultimate goals of the development of the region.

One of the tasks is the calculation of scientific and technical progress in the system of economic estimates as an endogenous factor. Various mathematical economics models can be used for this purpose. It seems most advisable to regard the mentioned methods of forecasting scientific and technical progress as interconnected and complementary methods. Thus, there is the attempt to model the economy of the Ukrainian SSR, when an individual component, which characterizes "autonomous" technical progress, is inserted in the equation for the volume of output. Moreover, scientific and technical progress can be calculated indirectly through the coefficients of the retirement of fixed capital, the rates of amortization and the coefficients of material expenditures.

The use of balance sheet models for studying the regional economy make it possible to conclude that the calculation of scientific and technical progress in the model of the intersectorial balance of the region can be accomplished by the inclusion in the model of the methods of saving, in which the coefficients of the direct material and manpower expenditures are made dependent on the capital investments allocated for the accomplishment of technical progress.

The use of optimization models will make it possible to determine the optimum plan of the development of the economy as a result of the choice of various technological modes of the production and consumption of products, which have been developed with allowance made for the regional peculiarities of scientific and technical progress. Optimization can be carried out on the basis of various criteria, the selection of which should be made on the basis of the goals of regional development, which were set in light of statewide interests, as well as with allowance made for the influence of scientific and technical progress on the economy of the region.

The use of network models for the management of scientific and technical progress in a region, by means of which the optimum description and the periods of the implementation of specific measures on the introduction of the results of scientific research can be obtained, seems justified. It is advisable to use a diagram model for the adequate representation of the structure of a phenomenon for the purpose of studying and systematizing the interaction of its components. Their essence consists in the formal representation of the structure of some process on the basis of the search by diagram algorithms for the structural characteristics (numbers) of these models.

In the national economy with its complex interregional and intersectorial relations there have always been many different possible directions of the development of the economy with allowance made for the fact that scientific and technical progress leads to major structural shifts. The proper calculation of the intersectorial proportions of the national economy and the selection among the different directions of the structural shifts in the economy are possible only with the use of a group of national economic optimization models.

Consequently, the forecasting of scientific and technical progress should be based on a system of mathematical economics models (the network model, statistical economics methods, the intersectorial optimization model of a region, production functions), the coordination of which is an independent problem.

At the Institute of Economics and the Organization of Industrial Production of the Siberian Department of the USSR Academy of Sciences it is planned to make a study of the reciprocal influence of the regional program of scientific and technical progress and the development of the economy of Krasnoyarskiy Kray with the use of an intersectorial balance sheet model. It is proposed to make on the basis of this model a series of variant estimates which provide for the labor-saving nature of scientific and technical progress and to study the questions of its influence on the change of the economic indicators of the kray. The information obtained during the elaboration of the regional scientific and technical program can serve as the basis when preparing the data for the calculations. For taking into account not only the regional, but also the national economic factors which influence scientific and technical progress in the region, it is necessary to modify the model of the functioning of the economy of the kray by including a national economic block, which subsequently can lead to the development of two-level systems of models: the national economy--the region.

At the same time as the making of calculations according to the balance sheet models it is proposed to use network models for the choice of the ratio between the directions of scientific and technical progress and for the allocation of capital investments, manpower, material and financial resources for the implementation of the regional scientific and technical program. It is planned to coordinate the balance sheet and network models according to the periods of the implementation of specific measures, the amounts of allocated resources and others. It also seems possible to use the production functions, which include scientific and technical progress as an independent factor, for estimating the influence of scientific and technical progress on the economy of the kray in an aggregated form.

The structure of the regional scientific and technical program encompasses both the general sectorial regional scientific and technical problems and the problems of the sectorial complexes of the region. The analysis of these two groups of problems makes it possible to identify the most important scientific and technical questions, the solution of which requires the adoption of directives at the state level. These problems constitute a separate block in the structure of the regional scientific and technical program. The program approach also requires the presence in the structure of the comprehensive regional scientific and technical program of such elements as the program of the development of the scientific and technical potential of the region and the substantiation of the organizational and economic mechanism of the management of scientific and technical progress in the region. At the stage of structural development the main measures of the program, the composition of the elaborators of the problems and the organizations which produce and introduce the technical systems are specified and coordinated.

The methodological questions of developing regional scientific and technical programs, which are raised in the article, do not exhaust all the aspects of their elaboration. The standard plan indicators of scientific and technical progress should be consistenly taken into account at all stages of the planning of the development of production in the region.

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ECONOMIC MODELING AND COMPUTER TECHNOLOGY APPLICATION

MODELING OF PRODUCTION SHOP OPERATIONS

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 4, Apr 81 pp 50-54

/Article by Candidate of Economic Sciences Docent V. Samborskiy: "Improvement of the Economic Analysis of the Production Activity of Shops and Enterprises on the Basis of Matrix Models"/

/Text/ At the present stage, under the conditions of the rapidly growing scale of the Soviet economy, the complicated structure of the national economy and the exceptionally diverse economic relations the problem of the timely and scientifically sound making of decisions at all levels of management is arising. The permitted oversights are inevitably leading to considerable losses and the decrease of production efficiency. Economic analysis on the basis of matrix models is being used more and more extensively in the process of elaborating and making decisions--for the purpose of their scientific substantiation for identifying and mobilizing intraworks reserves. The latter make it possible to identify the interrelationship of the various factors of the activity of an enterprise and its shops, to establish the cause-effect relations of the indicators, as well as to regulate deviations.

Matrix models have acquired some use in current planning at the industrial enterprise. Methods of constructing matrix models of the technical, industrial and financial plan and accounting models have been examined in some works.[1] The elaborated sets of matrix models describe both individual objects of planning and their system as a whole. The construction of planning and accounting matrix models for each shop and enterprise makes it possible to reflect the output and distribution of products with simultaneous coordination with the indicators of the expenditures on their production.

Individual studies have been devoted to the use of matrix models for the development of the subsystem of technical and economic planning in the automated control system of the enterprise. The authors came to the conclusion that among the mathematical economics models, which are applicable in planning the work of an enterprise, the most efficient are the matrix models, which reflect with sufficient accuracy the laws of the development of production at the enterprise as a whole, in its shops and by types of products. Matrix models are a modified version of mathematical economics balance models. Their use in the management of enterprises ensures the unity of planning methodology at all the levels of industrial production (the enterprise, the sector, the national economy).[2]

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[1] See M. M. Fedorovich, "Matematicheskaya model' tekhpromfinplana" /A Mathematical Model of the Technical, Industrial and Financial Plan/, Moscow, "Ekonomika", 1962; V. I. Danilin, "Ekonomiko-matematicheskiye modeli godovogo planirovaniya na predpriyatii" /Mathematical Economics Models of Annual Planning at an Enterprise/, Moscow, "Nauka", 1975.

According to a study of the methodology of compiling matrix models for the technical and economic planning of the operation of an enterprise, they can be used effectively for making a comprehensive economic analysis. This requirement also stems from the need and possibility of achieving the unity and coordination of the methods of planning, analysis and management under the conditions of the automated control system of the enterprise. A uniform methodology of the planning, accounting and analysis of the indicators of the operation of an enterprise is used in the practice of organizing the analysis with the manual processing of the information. The method of the planning and analysis of labor productivity and the production cost by factors can serve as an example.

The practical implementation of planning on the basis of matrix models gives rise to the need and possibility of making a comprehensive economic analysis with the use of the same models. However, a set of models, which would reflect the interconnected system of indicators by objects and levels of management (the enterprise, the shop, the section) and would ensure their generalization and breakdown by subordinate levels, should be constructed for this.

Analytic matrix models should be elaborated on the basis of the uniform methodology which is used when constructing models of planning. This will make it possible to optimize the planning matrices, to standardize the software and to obtain output analytical computer printouts for computers.

In order to make a comprehensive economic analysis with the use of matrix models, it is necessary to examine the most important methodological premises which are the basis for it. In the literature various sets of matrix models are known: the matrix technical, industrial and financial plan in physical terms, the model of the structural unit in physical terms, the matrix model in value terms for the structural unit, the matrix model of the enterprise, the mixed matrix model and others. In the case of a comprehensive analysis it is expedient to use modified versions of various matrix models. Such models make it possible to regard the enterprise as a system and its shops as the components of the system. Moreover, on the basis of these models it is possible to study a specific interconnected system of technical and economic indicators.

Depending on the goals set for the analysis, it is possible to use certain types of matrix models or others. Thus, the matrix model of the order (item) is used for the analysis of the production economics relations of the shops of the enterprise in the process of manufacturing a specific type of product, the output of the final product of this type and the expenditures of the shops on its output with a breakdown by items. The analysis of the activity of the shop is made on the basis of its matrix model, in which the indicators of its activity can be given in detail by sections and workplace.

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[2] See "Sistema matrichnykh modeley mekhaniko-ekonomicheskogo upravleniya na predpriyatii" /A System of Matrix Models of Mechanical-Economic Management at an Enterprise/, Moscow, "Nauka", 1977, p 16.

in the case of a comprehensive economic analysis of the activity of an enterprise, its shops and sections it is necessary to construct a matrix model of the enterprise, which is a square matrix consisting of three sections. In the first section the rows of the matrix model the production and distribution of the intermediate product, while the columns of the matrix model its consumption. In the second section the output by each shop and the enterprise as a whole of the final product and the gross output is modeled. The third section models the expenditures on production by components or costing items.

Planning and accounting data are necessary for the analysis of the indicators, with the use of matrix models. The interrelations between the elements of the system are determined by the following equation:[3]

$$\sum_{j}^{n} X_{ij} + Y_i = X_i \quad (i=1, 2, \ldots n) \qquad (1.1)$$

where X_{ij} is the volume of the intermediate product, Y_i is the volume of the final product, X_i is the volume of the gross output.

The dependence between the volume of the intershop transfer (X_{ij}) and the production volume of the recipient shop (X_j) is calculated by means of the proportionality coefficient (a_{ij}):

$$a_{ij} = \frac{X_{ij}}{X_j} . \qquad (1.2)$$

This coefficient characterizes the consumption of the output of the recipient shop per ruble of output of the consuming shop or the quantitative estimate of the relations of cooperation of the shops of the enterprise, that is, it acts as the coefficient of direct costs. Through this coefficient equation (1.1) cited above can be expressed in the form:

$$\sum_{j=1}^{n} a_{ij} X_j + Y_i = X_i \quad (i=1, 2, \ldots n) \qquad (1.3)$$

or in the matrix form:

$$Ax + Y = X, \qquad (1.4)$$

where A is the matrix of the coefficients of direct costs, $Y = (Y_1, Y_2, \ldots Y_j \ldots Y_n)$ is the column vector of the commodity production, $X = (X_1, X_2, \ldots X_j \ldots X_n)$ is the column vector of the gross output.

The examined mathematical dependences, which characterize the production and distribution of the output of the enterprise, as well as the structural interrelations between the individual shops, are the basis for the comprehensive analysis of the activity of the shops and the enterprise as a whole.

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3. "Sistema matrichnykh modeley tekhniko /sic/-ekonomicheskogo upravleniya na predpriyatiyakh," pp 54-55.

The matrix model has its inputs and outputs. The consumption by a specific shop of the intermediate production of all other shops and the expenditures of each shop and the enterprise as a whole on the output of products, which are modeled by the entries of the columns of section I and section III of the matrix, are the inputs. The output by the shop of the intermediate product and its distribution among the other shops, as well as the output of the final product and the gross output, which are modeled by the rows of sections I and II of the matrix, serve as the outputs.

The outputs of some elements are the inputs into other elements. Thus, the output of the production of one shop is the inputs from other shops in conformity with the technological process of production. Consequently, if a change of the input of just one element of the system takes place, it is possible to predict the possible changes of all the other elements.

The normal functioning of an enterprise is governed by the strict coincidence of the inputs and outputs of all the elements of the system. During the production process various deviations arise, which cause disturbances of the elements of the input and, consequently, of the output. This requires the comprehensive analysis of the state of the system for the purpose of making the appropriate decisions on the elimination of the disproportions in the work of the shops and the enterprise as a whole.

In the case of a comprehensive economic analysis with the use of matrix models it is possible to establish:

the deviation from the plan in the production of products for the enterprise as a whole due to changes of the output by individual shops, orders and types of products;

the deviation from the plan in the expenditures on production for the enterprise as a whole due to changes in the expenditures by individual shops, orders and types of products being produced;

the influence of the allowed deviations on the ultimate indicators of the work of each shop and the enterprise as a whole;

the trends of the change of the technical and economic indicators of the enterprise and its subdivisions and the quantitative relationships of the influence of the deviations in the indicators of the work of one shop on the activity of the other shops, which are connected with it with respect to the technological process of production;

the causes of and the persons to blame for the deviations, the permitted disruptions and the available production reserves;

the amount of the damage as a result of the deviations in the inputs and outputs by individual shops and the enterprise as a whole;

the directions of the regulation of production, the possible measures on the elimination of the shortcomings and the mobilization of production reserves.

The enumerated tasks do not cover, of course, the entire range of problems of the production operations and financial activity of the enterprise; other directions of the comprehensive analysis with the use of matrix models are also possible. However, the accomplishment of these tasks makes it possible to analyze the production activity most comprehensively, to identify the interrelations of the changes in the technical and economic indicators of the shops and the enterprise as a whole, to reveal and utilize the available reserves, which will ensure an increase of production efficiency.

The statement and accomplishment of the tasks of the comprehensive economic analysis on the basis of matrix models are possible when creating the data base of the automated control system of the enterprise not only for the enterprise, but also for all the shops, production sections and brigades with a breakdown by individual types of products which are being produced. The most advanced forms and methods of the organization of the work progress report and the accounting should be used for obtaining such data. Some methodological rearrangement of the organization of the planning and accounting of the expenditures on production by individual shops is also necessary, that is, the production cost of the output of the enterprise should be the same--both in the plan and in the reporting--as the production cost of the output of all the main shops. This will make it possible to develop various modified versions of the matrix models, which analyze comprehensively the various systems of technical and economic indicators for all the objects, levels and time periods of management.

It is possible to distinguish the following stages as the main stages of the accomplishment of the task of the comprehensive analysis of the production activity of the enterprise as a whole and the individual shops:

the construction of a matrix of the interrelations of the shops and the quantitative estimate of the structure of these interrelations;

the construction of planning matrices of the output of products and the expenditures on production by orders (items), shops and the enterprise as a whole;

the construction of accounting matrices of the output of products and the expenditures on production by orders (items), shops and the enterprise as a whole;

the calculation of the proportionality coefficients (a_{ij}) according to algorithm (1.2), which was cited earlier;

the construction of a matrix of the deviations of the actual production volumes from the planned production volumes in accordance with the intershop transfers ($\pm \Delta X_{ij}$) and the deviations in the gross production volumes of the recipient shops, which are directly connected with the consuming shop (ΔX_i and ΔX_j);

the calculation of the deviations in the production volumes of the shops, which are indirectly connected with this shop through the recipient shops on the basis of the use of the algorithms reflected in the matrix of interrelations;

the compiling of an output table according to the calculation of the deviation of the individual technical and economic indicators of the recipient shops of the given shop and the enterprise as a whole due to a change of the structure of the interrelations;

the formulation of conclusions and suggestions on the basis of the output analytical tables.

The economic content and the logical and quantitative interrelations of the matrix model are not characterized unambiguously. Thus, the proportionality coefficients of the matrix of interrelations can assume values from 0 to 1. The deviations in the gross production volumes of the shops show to what extent the planned intershop proportions, which are expressed through the coefficients of direct costs, have been observed. When $\Delta X_j > 0$, this attests to a decrease of the commodity output of the shop and to the growth of the amount of unfinished production, to a decline of labor productivity and, consequently, to a worsening of the technical and economic indicators of the activity of the given shop. If $\Delta X_i < 0$, this attests to the existence of a disproportion not only in the given shop, but also in the shops which are directly or indirectly connected with it. Such disproportions will lead to the worsening of the technical and economic indicators of the elements and the entire system as a whole.

The arising positive and negative deviations according to the intershop transfers of products have an influence on the technical and economic indicators of the work of both this shop and the recipient shops which are connected with it with respect to the technological process of production. The influence of the deviations on the measurement of the production volume can be calculated according to the equation:

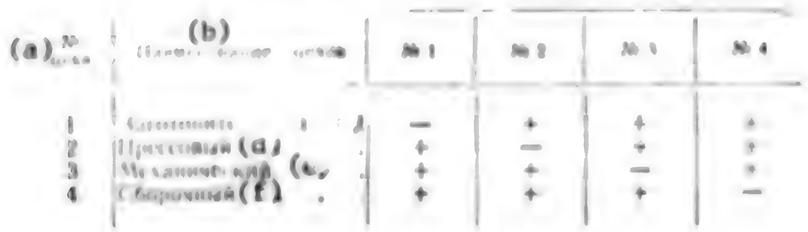
$$\Delta X_j = \frac{\Delta X_{ij}}{a_{ij}} \cdot \qquad (1.5)$$

The positive deviations with respect to the intershop transfers ($+\Delta X_{ij}$) are responsible for the increase of unfinished production, the slowing of the turnover rate of working capital, the increase of losses from defective work and the decrease of labor productivity.

Using the elaborated method, let us analyze on the basis of the arbitrary example of the Soyuzgazmashapparat Production Association its production activity, the data on the interrelation of the shops of which are cited in Table 1.

Table 1

Matrix of Interrelation of Shops



(a) № цеха	(b) Наименование цехов	№ 1	№ 2	№ 3	№ 4
1	Заготовительный (c)	—	+	+	+
2	Прессовый (d)	+	—	+	+
3	Механический (e)	+	+	—	+
4	Сборочный (f)	+	+	+	—

Key:

a. Shop number
b. Description of shops
c. Billet
d. Press
e. Machine
f. Assembly

According to the data of Table 1, all the shops at this enterprise are interconnected in the process of the output of products. The change as against the plan in the production volume of one of the types of products for any shop will lead to disproportions of the output of both the final product and the gross output for the other shops. This, in the end, will entail changes in the expenditures on production and in the other technical and economic indicators of the individual shops and the enterprise as a whole.

The quantitative interrelations of the shops of the enterprise in question are presented in Table 2.

Table 2

Planning Matrix of the Interrelation of Production Shop No 1
(thousands of rubles)

(1) № цеха получателя	(2) Затраты				(7) Товарная продукция
	(3) материалы	(4) комплектующие изделия	(5) зарплата	(6) себестоимость	
№ 2 . . .	25	5	16	150	190
№ 3 . . .	40	8	20	180	220
№ 4 . . .	50	5	22	200	230
(8) Итого по цеху № 1 . . .	115	18	58	530	640

Key:

1. Number of recipient shop	5. Wages
2. Expenditures	6. Production cost
3. Materials	7. Commodity production
4. Components	8. Total for shop No 1

The cited data (see Table 2) show that during the year shop No 1 should produce commodity production worth 640,000 rubles, of which it should transfer 130,000 rubles of it to shop No 2, 220,000 rubles to shop No 3 and 230,000 rubles to shop No 4. Disruptions in the deliveries of products to the shops under subcontracting arrangements lead to a disproportion in the fulfillment of the plan and to changes in the technical and economic indicators.

As the analysis of the data of Table 3 attests, shop No 1 did not fulfill the plan of deliveries for shop No 3 (by 10,000 rubles) and exceeded it for shop No 4 (by 20,000 rubles). As a result shop No 3 fell short in the output of the commodity production by 27,300 rubles, while shop No 4 increased the production volume by 56,500 rubles.

On the basis of the matrix of interrelations it was established that production shop No 1 not only is connected directly with recipient shops No 2, No 3 and No 4, but is also indirectly connected with shops No 16 and No 17; that is, the change in the production volumes of these shops will also influence the commodity output. The method of calculating the influence of the shortage with respect to the intershop transfer on the increase of the production volume is similar to the one set forth above and the calculation is made according to equation (1.6).

Table 3

Deviations of the Production Volume by Shops of the Enterprise (thousands of rubles)

(1) Цеха-получатели	№ 2	№ 3	№ 4	(2) Итого
(3) Объем товарной продукции цеха № 1:				
(4) по плану	190	220	230	640
(5) по отчету	190	210	250	650
Отклонения: (6)	0	—10	+20	+10
в % (7)	0	—4,5	+ 8,7	+ 1,6
(8) Плановые объемы производства цехов-получателей	520	600	650	—
(9) Коэффициенты прямых затрат	0,3654	0,3667	0,3538	—
(10) Отклонения в объемах производства цехов-получателей за счет изменения в выпуске продукции цеха № 1 (стр. 2 : стр. 4)	0	—27,3	+56,5	—

Key:

1. Recipient shops
2. Total
3. Volume of commodity production of shop No 1
4. According to the plan
5. According to the report
6. Deviations
7. Percent
8. Planned production volumes of recipient shops
9. Coefficients of direct costs
10. Deviations in the production volumes of the recipient shops due to a change in the output of products of shop No 1 (row 2 : row 4)

In the future it is necessary to establish the change in the technical and economic indicators of the shops and the enterprise as a whole as a result of the allowed disproportions in the volume of the commodity output. The results of the calculations are represented in the following output form (see Table 4).

Table 4

Influence of the Change of the Production Volume on the Technical and Economic Indicators of the Shops of the Enterprise

(1) № цеха	(2) Снижение объема производства		(4) Прирост остатков незавершенного производства (тыс. руб.)	(5) Снижение оборачиваемости оборотных средств (дни)	(6) Снижение производительности труда	
	(3) тыс. руб	%			(7) руб	%
№ 3	27,3	4,6	27,3	0,8	15,6	2,4
№ 9	22,6	3,2	22,6	0,6	14,3	2,1
№ 16	13,1	1,7	13,1	0,7	9,4	1,8
№ 17	18,2	2,1	18,2	1,1	10,2	1,9

Key:

1. Shop number
2. Decrease of production volume
3. Thousands of rubles
4. Increase of balances of unfinished production (thousands of rubles)
5. Decrease of turnover rate of working capital (days)
6. Decrease of labor productivity
7. Rubles

From the data of Table 4 it follows that the nonfulfillment by the shops of the plan on intershop transfers led to a decrease of their commodity output, which, in turn, entailed an increase of the balances of unfinished production, the decrease of the output per worker (by 1.9-2.4 percent) and the slowing of the turnover rate of the working capital (by 0.8-1.1 days). In addition to the enumerated indicators it is also possible to calculate the influence of the disproportions in the output of products by the production shops and the consuming shops on the change of the output-capital ratio, the level of the equipment workload, the profit and the profitability.

It is especially important to take into account the results of the analysis of the influence of the deviations in the intershop transfers when organizing intraplant cost accounting. In particular, the system of penalties between shops can be organized on the basis of the real indicators of the change of the volume of commodity output subject to the insufficient delivery of certain semimanufactures and components or others.

The study of the methodology of analyzing the activity of shops and enterprises with the use of matrix models makes it possible to draw several conclusions.

The improvement of the comprehensive analysis dictates the need for the use of a uniform methodology of the planning and calculation of the entire system of indicators of the activity both for the enterprise and for its shops. This will make it possible to coordinate the results of the work and the technical and economic indicators of the shops and the entire enterprise.

The work not only for each shop as a whole, but also with a breakdown by consuming shops which are directly or indirectly connected with it should be planned and taken into account for the efficient organization of the system of the comprehensive economic analysis of the activity of the shops and the enterprise.

In order to make a comprehensive analysis under the conditions of the automated control system of the enterprise, it is necessary to create a basis from the data not only for the enterprise as a whole, but also for its structural subdivisions.

The existence of positive and negative deviations on the intershop transfers leads to the worsening of the indicators of both the production shop and the consuming shops. Positive deviations will improve their activity and, consequently, the technical and economic indicators, if a proportionality of the change of all the elements of the system is achieved.

It is necessary to analyze the deviations on intraplant cooperation not only for the shop as a whole, but also with respect to individual orders, types of output being produced, sets and parts, and to calculate their influence on the entire system of technical and economic indicators.

The further development of the comprehensive analysis on the basis of the use of matrix models should proceed in the direction of the improvement of the method of calculating the coefficient of the direct and total costs, the maximum coverage of the interrelations of the elements of the system, the quantitative estimate of the influence of the change of one of the indicators on the entire system of the other indicators which are interconnected with it.

The material liability in the system of intraplant cost accounting should be governed by the negative deviations which have formed as a result of a change of the intershop deliveries.

The comprehensive economic analysis ensures the elaboration and making of management decisions on the improvement of the shop structure of the enterprise; on the improvement of intershop relations and the elimination of interplant disproportions in the deliveries of products under subcontracting arrangements; on the elimination of the disproportions in the provision with production capacities, fixed capital, manpower and material resources and in their use; on the substantiation of current and day-to-day intershop and intrashop planning, the organization of labor and production; on the identification and mobilization of reserves for the purpose of further increasing production efficiency.

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